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THE ASSEMBLY LINE

by William Barden, Jr.

"A table in assembly language programs usually refers to a collection of data organized in one contiguous block."

I'll be discussing table look-ups and cassette tape calls this month. Next month I'll continue the discussion of high-speed graphics, using some of the table look-up techniques discussed here. (I know, I know, but promises are made to be broken.)

Many assembly language programs use tables, rather than BASIC DATA statements. It's important to know the various ways in which data in the tables can be accessed, or retrieved. There are a number of different approaches and presented below is a potpourri of them for your amazement and amusement.

I'll also discuss a cassette driver using Level II ROM subroutines that can be used to read or write cassette tape files.

How to Win at the Tables

A table in assembly language programs usually refers to a collection of data organized in one contiguous block. Contiguous simply means that the block of data occupies consecutive memory locations. The first byte of data might be at location 8000H (32768 decimal) in RAM, the second byte at location 8001H, the third at 8002H, and so forth. This arrangement is similar to the BASIC DATA statement, where one piece of data follows another, however, the data are probably not contiguous in memory, but distributed in BASIC statement lines.

Of course, as many tables can exist in memory as we want, each one occupying its block of contiguous memory locations. How

```

00100      TABLE      ORG      8000H      ;START OF TABLE, PROGRAM
00110      EQU          $              ;USING EQU HERE IS OPTIONAL
00120      DEFM        'CALOSANGELES'
00130      DEFM        'CABAKERSFIELD'
00140      DEFM        'ILCHICAGO'
00150      DEFM        'ILMOLINE'
00160      DEFM        'TXFORT WORTH'
00170      DEFM        'TXDALLAS'
00180      DEFM        'TXBIG SPRING'
    
```

Listing 1.

```

0060 54      00180      DEFM        'TXBIG SPRING'
0061 58
0062 42
0063 49
0064 47
0065 20
0066 53
0067 30
0068 52
0069 49
006A 4E
006B 47
006C 20
006D 20
006E 20
006F 20
0070 2100H0    00190 SCANF      LD      HL, TABLE      ;START OF TABLE
0071 111000    00200          LD      DE, 16             ;# OF BYTES PER ENTRY
0072 0607      00210          LD      B, 7               ;# OF ENTRIES
0073          00220 SLOOP      EQU      $               ;PUT PROCESSING HERE
0074          00230 ;
0075          00240 ;
0076          00250 ;
0077 19        00260          ADD     HL, DE              ;FIND NEXT ENTRY
0078 10FD      00270          DJNZ   SLOOP              ;GO IF NOT LAST ENTRY
0079          00280          END
0080 TOTAL ERRORS

SCANF      0070
SLOOP      007H
TABLE      0000
    
```

Listing 2.

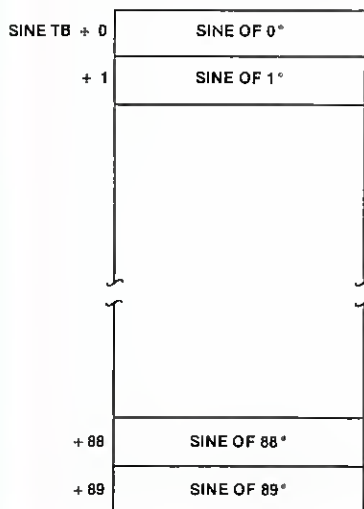


Fig. 1.

large can a table be? A single table might occupy all of RAM, or may be only one or two bytes.

As a matter of fact, tables may be "fixed-length" or "variable-length." A fixed-length table is a fixed number of bytes in memory, while a variable-length table may change its length "dynamically," as a program is running.

An example of a fixed-length table is a table of 90 bytes, each byte of which holds the sine value of 0 to 89 degrees, as shown in Fig. 1.

The Variable-length Table

An example of a variable-length table is a table of test scores of n number of bytes, each byte holding the score (from 0 to 100) of the First Annual TRS-80 BASIC Test at Big Spring, Texas. In this case, the number of test scores, n, must be held somewhere. It might be held in the first byte of the table, or in variable

NENTTS (the number of entries in the table of test scores).

Of course, the size of the variable-length table is not infinite. There must be some limit to the number of entries, so that enough contiguous memory is allocated to hold the maximum number of entries. If the table will be huge, it's a common practice to put it at the end of the assembly language program and let it build upwards in memory. This can be done by defining the table with an EQUate as in:

```

LD      (HL),A      ;STORE A REGISTER
JP      ATTN        ;JUMP TO ATTENTION
TABLE   EQU      $   ;DEFINE HUGE TABLE
END     FORUS       ;END STATEMENT
    
```

Now the table can expand upwards until it runs into the stack area. Because we don't want this to happen, the program must continually


```

1FA0 54      00180      DEFM      'TXBIG SPRING'
1FA1 58
1FA2 42
1FA3 49
1FA4 47
1FA5 20
1FA6 53
1FA7 50
1FA8 52
1FA9 49
1FAA 4E
1FAB 47
1FAC 20
1FAD 20
1FAE 20
1FAF 20
1FB0 21A01F 00190 SCANF LD HL, TABLE+6*16 ;START OF TABLE
1FB3 111000 00200 LD DE, 16 ;# OF BYTES PER ENTRY
1FB6 0607 00210 LD BC, 7 ;# OF ENTRIES
1FB8 00220 SLOOP EQU ;PUT PROCESSING HERE
00230 ;
00240 ;
00250 ;
1FB8 B7 00255 OR A ;RESET CARRY
1FB9 E052 00260 SBC HL, DE ;FIND NEXT ENTRY
1FB8 10FB 00270 DJNZ SLOOP ;GO IF NOT LAST ENTRY
0000 00280 END
00000 TOTAL ERRORS

SCANF 1FB0
SLOOP 1FB8
TABLE 1FA0

```

Listing 3.

```

8060 54      00180      DEFM      'TXBIG SPRING'
8061 58
8062 42
8063 49
8064 47
8065 20
8066 53
8067 50
8068 52
8069 49
806A 4E
806B 47
806C 20
806D 20
806E 20
806F 20
8070 210080 00190 SCANF LD HL, TABLE ;START OF TABLE
8073 111020 00200 LD DE, 16 ;# OF BYTES PER ENTRY
8076 017080 00210 LD BC, TABLE+7*16 ; (LAST ADDRESS ONE ENTRY)
8079 00220 SLOOP EQU ;PUT PROCESSING HERE
00230 ;
00240 ;
00250 ;
8079 19 00260 ADD HL, DE ;FIND NEXT ENTRY
807A E5 00265 PUSH HL ;SAVE NEXT ENTRY ADDRESS
807B B7 00268 OR A ;RESET CARRY
807C ED42 00270 SBC HL, BC ;TEST FOR END
807E E1 00275 POP HL ;RESTORE NEXT ADDRESS
807F C27980 00280 JP NZ, SLOOP ;GO IF NOT DONE
00285 ; DONE HERE
00290 END
00000 TOTAL ERRORS

SCANF 8070
SLOOP 8079
TABLE 8060

```

Listing 4.

check the size of the table to see that it doesn't reach the limiting number of entries, or the maximum boundary.

If the size of a variable-length table is smaller, then the table may simply be imbedded in the assembly language program itself, with enough space allocated to handle the maximum number of entries. This could be done with an EQUate, or (more commonly) with a DEFS, a DEFINE Storage.

```

TABLE EQU $ ;DEFINE TABLE OF
;100 BYTES

```

```

NEXT1 EQU $+100 ;RESERVE 100 BYTES
LD A,(HL) ;WE JUMPED HERE
;FROM SOMEWHERE ELSE

TABLE2 DEFS 100 ;DEFINE TABLE OF
;100 BYTES
NEXT2 LD A,(DE) ;WE JUMPED HERE FROM
;SOMEWHERE ELSE

```

There's no reason that table entries in either fixed or variable-length tables couldn't be any size. For example, each entry in a given table might have to be two bytes in size to hold ad-

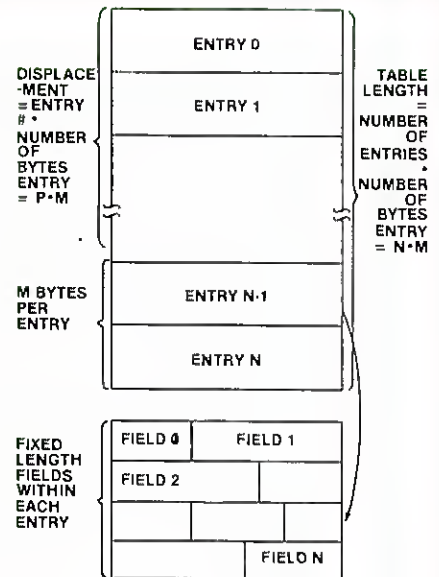


Fig. 2.

resses in memory, or the entries might have to be four bytes in size to hold values up to 4,294,967,295. Although we could make the entries variable length, it's probably more common to leave the entries a fixed length of a certain number of bytes, even though the number of entries in the table will be variable.

Also, there's no reason to limit each entry to a single item of data. Within each entry, there might be several "fields" of data. For example, a mail list table containing the names, addresses, and other descriptors of all TRS-80 users who have never duplicated copyrighted programs, might be a fixed-length table with only 10 entries!

Each entry is further subdivided into a last name, first name, street address, city, state, zip, and miscellaneous field. Each field is also fixed-length; the length for each field is defined as the maximum number of bytes necessary to represent the data. The zip code field is probably five bytes, while the last name field might be 20 bytes.

What do we have up to this point? We have a table of a certain number of entries, let's say "n," with each entry a fixed length of "m" number of bytes, and each entry possibly subdivided further into fixed-length fields. Each is a specific number of bytes. The parameters of this general table are shown in Fig. 2. The size of the table is the number of entries times the number of bytes per entry, $n \cdot m$, while the "displacement" of any entry from the beginning of the table is given by $p \cdot m$, where p is the number of the entry, starting from 0, and counting up through 1, 2, 3, and so forth.

Accessing Data in Tables

Now that we've defined what typical tables look like in assembly language, let's find out how to access the data within them. We won't talk about sorting (arranging the data within the tables) or searching (finding a key piece of data within the table), but just how to scan


```

0060 54      00180      DEFB      'TXSIG SPRING'
0061 58
0062 42
0063 49
0064 47
0065 20
0066 53
0067 50
0068 52
0069 49
006A 4E
006B 47
006C 20
006D 20
006E 20
006F 20
0070 FF      00185      DEFB      OFF      ; -1 FOR TERMINATOR
0071 210000   00190 SCANF   LD      HL, TABLE ; START OF TABLE
0072 111000   00200      LD      DE, 16      ; # OF BYTES PER ENTRY
0073      00210 SLOOP   EQU      $
0074 7E      00220      LD      A, (HL)      ; GET ENTRY
0075 40FF     00230      CP      0FFH       ; TEST FOR TERMINATOR
0076 2603     00240      JR      Z, DONE      ; GO IF TERMINATOR
0077      00250 :
0078      00260 : PUT PROCESSING HERE
0079      00270 :
0080      00280 :
0081 19      00290      ADD     HL, DE      ; FIND NEXT ENTRY
0082 1BFB     00300      JR      SLOOP      ; GO FOR NEXT ENTRY
0083      00310 DONE   EQU      $          ; MORE CODE HERE
0084      00320      END
0085 TOTAL ERRORS

DONE      007F
SCANF     0071
SLOOP     0077
TABLE     0000

```

Listing 5.

```

0000      00100      ORG      0000H      ; CHANGE FOR YOUR SYSTEM
0001      00110 :*****
0002      00120 :* SUBROUTINE TO READ OR WRITE CASSETTE RECORD *
0003      00130 :*****
0004      00140 :
0005 CD1202   00150 CASTPE CALL 212H      ; TURN ON CASSETTE
0006 CB41     00160      BIT      0,C      ; TEST READ OR WRITE
0007 100E     00170      JR      NZ, CWRITE ; GO IF WRITE
0008      00180 : READ HERE
0009 CD9602   00190      CALL 296H      ; READ LEADER AND SYNC BYTE
000A CD3502   00200 RLOOP CALL 235H      ; READ ONE BYTE
000B 77      00210      LD      (HL), A    ; STORE BYTE
000C 23      00220      INC     HL         ; BUMP POINTER
000D 10F9     00230      DJNZ    RLOOP      ; GO IF MORE TO READ
000E CDF801   00240 RLOOP1 CALL 1FBH      ; TURN OFF CASSETTE
000F C9      00250      RET              ; RETURN
0010      00260 : WRITE HERE
0011 C5      00270 CWRITE PUSH BC      ; SAVE BYTE COUNT
0012 CD8702   00280      CALL 287H      ; WRITE LEADER AND SYNC BYTE
0013 C1      00290      POP     BC         ; RESTORE BYTE COUNT
0014 7E      00300 WLOOP LD      A, (HL)  ; GET BYTE TO WRITE
0015 CD6402   00310      CALL 264H      ; WRITE ONE BYTE
0016 23      00320      INC     HL         ; BUMP BUFFER POINTER
0017 10F9     00330      DJNZ    WLOOP      ; GO IF MORE TO WRITE
0018 18EE     00340      JR      RLOOP1    ; GO TO TERMINATE
0019      00350      END
0020 TOTAL ERRORS

CASTPE     0000
CWRITE     0015
RLOOP      000A
RLOOP1     0011
WLOOP      001A

```

Listing 6.

through a table from beginning to end.

You can scan the table, forward and backward. Assume that we have a typical table in RAM referenced by the name TABLE and made up of a fixed number of seven entries. Each entry is 16 bytes long; the first two bytes are a two-byte state name in ASCII format, while the next 14 bytes are a city name in ASCII format, with trailing blanks. The table is defined during assembly, but could have been filled dynamically. The table before assembly is shown in Listing 1.

We may want to scan through the table forwards, looking for a state or city name as we

do. In this case we need to start with the location of TABLE, and end with the last entry.

Each time we want to move to the next entry, we need to increment a pointer by 16, the number of bytes per entry. Listing 2 shows how this can be done for the table above. HL is set up as a pointer to TABLE. HL is incremented by the bytes of each entry, adding the 16 in DE to HL for each new entry. The number of entries is put into the B register initially; in a variable-length table the number of entries could be taken from the NENT variable, the current number of entries.

To scan the same table backwards, the HL

pointer is set up to the address of the last entry in the table, and HL is adjusted by subtracting the size of each entry from HL. This procedure is shown in Listing 3. HL is initially set to TABLE + 6*16, which corresponds to the address of the last entry (Let the assembler perform those odious computations for you!). DE is set to 16, the number of bytes per entry as before, and B holds the number of entries. Remember that in subtracting, the carry flag must first be set to 0, as the subtraction is a "subtract carry."

The index registers, IX or IY, could be used in place of the HL pointer to facilitate access of the fields in each entry, as in:

```

LD      A, (IX+2) ; GET FIRST BYTE OF
; CITY NAME IN ENTRY

```

The scheme above works fine, as long as the number of entries is less than or equal to 256 (Zero is used in B for 256 entries). If the number of entries in the table is greater than 256, though, we can no longer use the DJNZ instruction to decrement an entry count in B. We could use the BC register pair to hold the entry count, and decrement BC. However, to test for zero in this case, we would have to load A with B and OR in C, as DEC BC does not set the zero flag!

An alternative approach is to work directly with the pointer addresses, and test for the last address. This is shown in Listing 4 for the scan forward case.

Here, HL is loaded with the start of TABLE, as before. DE is loaded with the number of bytes per entry, as before. BC is loaded with the address of the last entry in the table plus one entry, TABLE + 7*16.

In scanning through the table, HL is incremented by adding DE. Afterward, the current address is saved in the stack, and BC is subtracted from HL. If the result is zero, the Z flag is set, and the scan is over.

Note that the current address is restored to HL by "popping" the stack before the JP test of the Z flag; popping the stack to a register pair never affects the flags (except for POP AF). This same scheme can be used in scanning through the table backwards.

Assembly language programmers are noted for avoiding work whenever possible. As a true test of your abilities in this pursuit, can the reader find a cleaner way to scan the tables, one that involves fewer instructions?

Several alternatives are possible. One way might be to take advantage of the CPI or CPD instructions. These instructions automatically increment (CPI) or decrement (CPD) a pointer in HL by one, decrement a count in BC by one, and compare a key in the A register. They will also set the Z flag, if the key compares to the contents of the location pointed to by HL, and reset the P/V flag if the count in BC is decremented down to zero.

The kicker here is that the pointer is adjusted only by one, and not by the number of bytes per entry. However, it is a simple matter to perform an add (or subtract) from DE to further adjust the pointer by the number of bytes-1 in something similar to:

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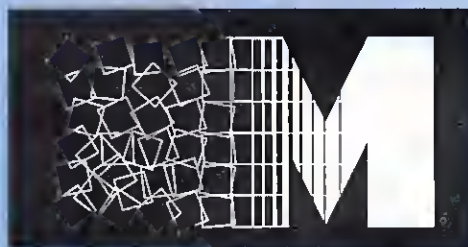
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80 APPLICATIONS

by Dennis Kitsz

*"Whenever we LIST,
we are asking Level II
BASIC to take a program
and translate it for our eyes."*

Graphics: fun to have, frustrating to set up. If you would like a better way, then SEES-SPOT! is for you. At a cost of a mere hundred bytes, you can have full graphics controlled directly from the TRS-80 keyboard.

Two keys, the up and down arrows, when shifted have no effect when used in normal BASIC. SEES-SPOT! redefines these shifted arrows as control keys to create all 64 graphics characters. Before turning to the program itself, let's have a look at those graphics characters. Run Example 1.

```
110 FOR X=128 TO 191
120 PRINT CHR$(X) " ";
130 NEXT X
```

Example 1

```
205 CLS
210 FOR X=0 TO 127
220 FOR Y=0 TO 2
230 SET (X,Y)
240 NEXT Y,X
250 GOTO 250
```

Example 2

```
305 CLS
310 FOR X=15360 TO 15423
320 POKE X,191
330 NEXT X
340 GOTO 340
```

Example 3

Different Methods

Now let's take a look at several ways of displaying those graphics in a BASIC program, from the slow and unwieldy to the fast and flexible. For a group of identical graphics, there are three common ways. (See Examples 2, 3 and 4.)

For groups of different graphics characters, programming starts to get just a little unpleasant. Have a look at Examples 5, 6 and 7.

Altogether, we have here five different ways of producing graphics: Examples 2 and 5 use the versatile, but extremely slow, SET and RESET commands. Example 3 POKES a group of characters into a specific place on the screen; Example 4 prints out a "string of strings."

Example 6 is a fast method of printing a string; it concatenates individual character strings to create one long series of graphics. It is flexible, too, but as you can see from the length of line 610 in this example, it takes a large amount of memory to define all the individual character strings necessary to create the graphic

patterns; just CHR\$(176), for example, uses nine letters to describe a single pattern.

Many of you have used these four methods of creating screen graphics. But now, let's take a look at another way, shown in Example 7. If you haven't actually run this program, give it a try now. See that a pattern is produced that is identical to those in the previous two examples. This is no surprise. But now LIST line 710.

```
AS="AUTONAMEDEF CMD"
```

What is this? How did it get there? In fact, this is the subject of another month's Applications, but let's take a brief look at what has happened to the original line 710,

```
AS="XXXX"
```

```
405 CLS
410 CLEAR 64
420 PRINT STRING$(64,191)
430 GOTO
```

Example 4

```
505 CLS
510 SET(0,0);SET(0,1);SET(0,2)
520 SET(1,0);SET(1,2);SET(2,0)
530 SET(3,1);SET(3,2);SET(4,2)
540 SET(5,2);SET(6,0);SET(6,1)
550 GOTO 550
```

Example 5

```
605 CLS
610 AS=CHR$(183)+CHR$(169)+CHR$(176)+
CHR$(133)
620 PRINT AS
630 GOTO 630
```

Example 6

```
705 CLS
710 AS="XXXX"
720 B=VARPTR (AS)
730 C=PEEK(B+1)+256*(PEEK(B+2))
740 POKE C,183;POKE C+1,169
750 POKE C+2,176;POKE C+3,133
760 PRINT AS
770 GOTO 770
```

Example 7

Four Distinct Commands

Notice, first, that there are four distinct command words buried inside this new line 710: AUTO, NAME, DEF and CMD. At this point there are as many words as there once were X's in this string; does that solve the mystery? In part. Line 730 uses a little-known BASIC command, VARPTR (VARiable POinTeR), which tells us some important things about variables and strings.

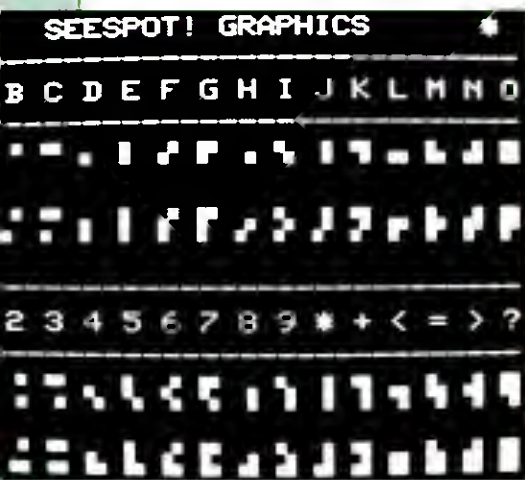
If you were writing BASIC, how would you find a variable in a program? You might have the language do one of two things: hunt through the program until it finds a variable, or refer to a table telling it where that variable is to be found.

Using the first method, who knows how long it will take to find a value located at the end of a program! So Level II BASIC saves information about each variable, and we can find that same information by using VARPTR. Simple? Well, maybe not quite, but PRINT VARPTR (AS) returns with the place in memory that stores the length of AS. The next two consecutive memory locations tell us where AS itself is stashed.

Look at line 730, which converts two decimal bytes into the full decimal address of AS. Since we now know where AS is, line 740 can take the four graphics characters we have used in the other examples, and POKE them in AS. The four X's disappear, and the graphics characters take their place when we PRINT AS.

But what about the strange changes in the program listing?

Whenever we LIST, we are asking Level II



BASIC to take a program and translate it for our eyes. From the computer's point of view (does it have one?), there's no use in storing PRINT as P-R-I-N-T; we humans are the only ones who need to read that.

Instead, the TRS-80 stores PRINT as the one-byte value of 179—which happens to be the same value as one of the 64 graphics characters! So when it sees our values of 183, 169, 176, and 133, the LIST routine says, "Aha, yes, a computer command . . . I will find it for this funny human and display instead a pretty word to read."

The result, in line 710, is AUTONAMEDEF-CMD. We'll cover this ground in the future; if you want to experiment, try to edit line 710 and see what happens. For now, let's get back to SEESPOT!

Look at Listing 1, an assembler version of the graphics program. I have to admit some ambivalence about including a completely annotated listing in this column, but some readers have requested that I expand my blocks of hex code for purposes of illustration—so this is an experiment. I look forward to your comments.

SEESPOT! Uses Muscle

In brief, SEESPOT! muscles its way into the normal keyboard scanning process of the TRS-80, but is careful not to destroy any other utilities that may be patched into the same place. If you are a program author, I strongly urge you to consider this technique, because it's especially frustrating for most of us, as average users, to receive a machine language program which effectively cancels out any other programs we are trying to use.

Once it's going, SEESPOT! checks to see if the computer is in command mode during a keyboard scan (recall that shift/up arrow is the cscape from the edit mode). If that checks out, it continuously looks at the keyboard until it spots the simultaneous depression of shift and either of the two vertical arrow keys.

If these three conditions are met, it can shift into its own, independent keyboard scan. It loops until it finds any other key depressed, or until the shift/arrow combination is lifted. It identifies the key pressed with address/data conversion routines, and creates a graphics character by tweaking the high bit of the byte. When it's all done, it returns a graphics character to the video display.

SEESPOT! may be entered using a monitor like T-BUG or an editor/assembler. It is easily relocated by changing the origin address in line 100, and takes care of its own housekeeping.

A BASIC listing is also provided. This is set to address 31729, which means you must respond to MEMORY SIZE? with that number. I have taken care to place SEESPOT! low enough that it should not conflict with most other utilities that you may be using. It, too, can be relocated, but you'll have to calculate its location and USR(0) entry points.

Graphics on the Screen

How is SEESPOT! used? Load your SYSTEM tape in place, or run the BASIC version. The BASIC program (Listing 2) may be deleted after it is run. A READY is returned to you,

```

00010 ; *****
00020 ; * SEESPOT! *
00030 ; *
00040 ; * KEYBOARD GRAPHICS PATCH *
00050 ; *
00060 ; * DENNIS BATHORY KITEZ *
00070 ; * ROXBURY, VERMONT 05669 *
00080 ; *****
00090 ORG 7C00H ; CHANGE TO RELOCATE
00100 ; *****
00110 ; * SELF-PATCH BLOCK *
00120 ; *****
00130 START LD HL,(4016H) ; KEYBOARD PATCH POINT
00140 LD (JUMPER),HL ; RETURN POINT SETUP
00150 LD HL,ENTRY ; GET ENTRY POINT READY
00160 LD (4016H),HL ; ENTRY POINT TO PATCH
00170 JP 06CCH ; RETURN TO BASIC
00180 ; *****
00190 ; * COMMAND MODE CHECK BLOCK *
00200 ; *****
00210 EX (SP),HL ; GET RETURN ADDRESS
00220 LD A,L ; GET LSB INTO A
00230 CP 5BH ; CHECK LSB OF 1D5BH
00240 JR NZ,NDTRDY ; OUT IF NOT
00250 LD A,H ; GET MSB INTO A
00260 CP 1DH ; CHECK MSB OF 1D5BH
00270 NOTRDY EX (SP),HL ; RETURN STACK ANYWAY
00280 JR NZ,AWAY ; BEGONE IF NOT 1D5BH
00290 ; *****
00300 ; * ARROW VERIFY BLOCK *
00310 ; *****
00320 ENTRY LD BC,3840H ; KEYBOARD ROW ADDRESS
00330 LD A,(BC) ; GET KEYBOARD DATA
00340 AND 18H ; CHECK IF UP/DN ARROW
00350 JR Z,AWAY ; BEGONE IF NOT
00360 ; *****
00370 ; * SHIFT VERIFY BLOCK *
00380 ; *****
00390 RLC C ; GET SHIFT KEY ADDRESS
00400 LD A,(BC) ; GET SHIFT KEY DATA
00410 CP 01H ; SEE IF SHIFT PRESSED
00420 JR NZ,AWAY ; BEGONE IF NOT
00430 ; *****
00440 ; * KEYBOARD EXAMINE BLOCK *
00450 ; *****
00460 LD HL,4036H ; GET KEYBOARD BUFFER
00470 RLC C ; GET FIRST KEYBOARD ROW
00480 LD D,0 ; SET DATA COUNTER
00490 AGAIN LD A,(BC) ; CHECK KEYBOARD DATA
00500 LD E,A ; SAVE DATA TO FREE A
00510 AND E ; CHECK TO SEE IF ZERO
00520 JR NZ,FOUND ; GO IF KEY DEPRESSED
00530 LD (HL),A ; CLEAR KEY ROW BUFFER
00540 INC D ; INCREMENT DATA COUNT
00550 INC L ; INCREMENT BUFFER ADD.
00560 RLC C ; GET NEXT KEYBOARD ROW
00570 LD A,C ; PUT ROW COUNTER IN A
00580 SUB 40H ; SUB. FINAL ROW VALUE
00590 JR NZ,AGAIN ; GO BACK IF VALID ROW
00600 JR ENTRY ; TRY AGAIN IF LAST ROW
00610 FOUND AND (HL) ; CHECK IF SAME KEY
00620 JR NZ,ENTRY ; TRY AGAIN IF SAME KEY
00630 LD (HL),E ; SAVE VALUE IN BUFFER
00640 ; *****
00650 ; * DEBOUNCE BLOCK *
00660 ; *****
00670 PUSH BC ; SAVE BC VALUES
00680 LD BC,200H ; LOAD DELAY VALUE
00690 CALL 0060H ; CALL DELAY SUBROUTINE
00700 POP BC ; RESTORE BC VALUES
00710 LD A,(BC) ; AGAIN CHECK KEYBOARD
00720 AND E ; AND WITH VALUE SAVED
00730 JR Z,ENTRY ; RELOOP IF A BOUNCE
00740 ; *****
00750 ; *KEY ADDRESS CONVERSION BLOCK*
00760 ; *****
00770 LD A,D ; GET DATA COUNTER BACK
00780 RLCA ; MOVE IT OVER
00790 RLCA ; MOVE IT OVER

```

Continue to next page

Continued from page 28

```

00000 RLCA ; AND ONE MORE TIME
00010 LD D,A ; SAVE PLAYTIME VALUE
00020 ; *****
00030 ; * KEY DATA CONVERSION BLOCK *
00040 ; *****
00050 LD C,1 ; SET UP SECOND COUNTER
00060 NOTYET LD A,C ; VALUE READY FOR PLAY
00070 AND E ; CHECK IF A MATCH
00080 JR NZ,GOTIT ; YEA, GO IF A MATCH
00090 INC D ; INCRMT. SHIFTED DATA
00090 RLC C ; READY NEXT MATCH TEST
00090 JR NOTYET ; GO BACK AND TRY AGAIN
00090 ; *****
00090 ; * GRAPHICS CREATION BLOCK *
00090 ; *****
00090 GOTIT LD A,(3040H) ; GET ARROW ROW AGAIN
00090 CP 10H ; SEE IF DOWN ARROW
00090 JR Z,NOBIT ; GET GOING IF IT IS
00090 LD A,90H ; UP ARROW SHIFT VALUE
00090 JR THERE ; SKITTER PAST MATH
00090 LD A,00H ; DOWN ARROW SHIFT
00090 ADO A,0 ; CREATE FULL GRAPHICS
00090 ; *****
00090 ; * JUMP / RETURN BLOCK *
00090 ; *****
00090 RET ; BACK AND DISPLAY IT
00090 AWAY DEFB 0C3H ; DEFINES JUMP COMMAND
00090 JUMPER DEFB 0E3H ; DEFINES NORMAL LSB
00090 DEFB 003H ; DEFINES NORMAL MSB
00090 ENO START ; DEFINE ENTRY ADDRESS
00090 ; *****
00090 ;

```

Listing 1.

```

5 POKE 16553,255
10 FOR X = 31744 TO 31859 : READ A : POKE X,A : NEXT X
20 POKE 16526,0 : POKE 16527,124 : MZ = USR(0)
30 DATA 42,22,64,34,114,124,33,27,124,34,22,64,195,204,6,227
40 DATA 125,254,91,32,3,124,254,29,227,32,86,1,64,56,10,230
50 DATA 24,40,78,203,1,10,254,1,32,71,33,54,64,203,1,22
60 DATA 0,10,95,163,32,12,119,20,44,203,1,121,214,64,32,241
70 DATA 24,217,166,32,214,115,197,1,0,2,205,96,0,193,10,163
80 DATA 40,201,122,7,7,87,14,1,121,163,32,5,20,203,1
90 DATA 24,247,58,64,56,254,16,40,4,62,144,24,2,62,128,130
100 DATA 201,195,227,3

```

Listing 2.

and the TRS-80 operates normally. Now depress the shift, followed by the down arrow. Type some letters . . . aha! Indeed, graphics on the screen! Try shift plus up arrow, and type. You've got similar results, but different characters are produced. Photo 1 shows the letter/number combinations and the respective graphics patterns.

Now, let's create a simple graphics string, in the program. Start a line: 10 AS="" and use SEESPOT! to type graphics characters in place. Close the quote marks, make line 20 PRINT AS, and RUN. There you are.

Now LIST the program—again, the graphics characters are turned into BASIC command words in the listing. Since the TRS-80 only has 256 different bytes with which to create everything—commands, mathematics, letters, graphics, data to tape, etc.—this shows one of the great economies of computer "innards." Our human languages are rich with letters, numbers, symbols, punctuation, musical notation and electronic characters. The TRS-80 has but 256 choices out of which to build its entire

computer vocabulary. With that economy come such curiosities as the "translation" of graphics into command words.

Remember, though, that translation also says "caution"—you may not edit a line containing such a graphics string! Even if you type EDIT 10, ENTER and ENTER again, the string has been completely redefined as you see it printed in the list. Try it and see.

Here's a final suggestion for insanely addicted BASIC programmers: It is possible to use SEESPOT! to write your BASIC command directly into the program, much like Web Associates' TSHORT program. With the two-level shift/arrow method, every BASIC command is available to you.

The hitch is this: they'll look like graphics until you LIST the program! Game? (Heh heh). Next month: Curiosities, Glitches, and Secrets.

I would appreciate hearing the experiences of readers who try using SEESPOT!. Address letters to my home address, Roxbury, Vermont 05669. ■

THE ASSEMBLY LINE

From page 24

```

LD HL,TABLE ;LOAD TABLE START
LD BC,7 ;LOAD NUMBER OF
;ENTRIES IN TABLE
LD DE,15 ;ENTRY SIZE-1
LD A,(KEY) ;SEARCH KEY
LOOP CPI ;SCAN TABLE FOR KEY
JR Z,FOUND ;GO IF FOUND
ADD HL,DE ;POINT TO NEXT
;ENTRY
JP PE,LOOP ;GO IF BC NOT ZERO

```

In the above code, the ADD HL,DE does not affect the P/V flag, which is used to test for an entry count in BC of zero. Also, only the first byte of each entry is tested by the CPI and scanning for a certain state name requires further processing.

Is there a cleaner way, you lazy coders? A common technique is to use a terminator for the table. (No, this is not a hit man from Fort Worth who seeks out TRS-80 compatible equipment suppliers.) This is a unique value that never appears in the table entries themselves. A commonly used value is -1. When a table is set up in this fashion, the next entry after the last entry in the table is set to the terminator value, and each comparison first looks for the terminator before testing the table entry.

This scheme is shown in Listing 5, which initializes the table with a terminator of -1. In a variable-length table it is convenient to fill the entire table first plus one entry with the terminator before dynamic entries; that way a terminator always exists.

How to Use (Expletive Deleted) Tape

Level II ROM, as many of you know, contains a number of interesting stand-alone subroutines. For those of you still using cassette, we'll offer the following subroutine, which reads or writes a cassette record (Listing 6). The calling parameters must be set up in the following registers:

```

(HL) = Buffer area for read or write
(B) = # of bytes for read or write (0 = 256)
(A) = 0 for cassette drive 1 or 1 for cassette drive 2
(C) = 0 for read or 1 for write

```

After first starting the cassette and writing 255 bytes of zeros and a sync byte, the subroutine, writes a cassette record of one to 256 bytes. The sync byte synchronizes the timing Level II cassette read routine to the start of the data on the tape. Data to be written on the tape must be in the buffer before the call is made to write.

It is good practice to checksum the data in the buffer by adding all bytes together. This is then written out as the first byte of data; a subsequent read then compares the cassette checksum with a checksum of the data that has been read to verify it.

When using TRSDOS, it is a good idea to disable interrupts by a DI instruction before CALLING this routine. The DI turns off the real-time clock interrupt to prevent inaccuracy by the cassette software timing loop. ■

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CAPTAIN 80

by Bob Liddil

"The Cat became well known for his convention antics, strutting about in Tabby ears and a striped tail."

Here's Captain Eighty, in his Woodfern and Boldword investigative reproter disguise, checking back into the office after an exhaustive look into the sad demise of the Cheshire Cat Software Company.

The Cheshire Cat began almost at the same time as the software industry. One talented programmer began the company by marketing his own creations.

Grew with the Industry

As the fledgling industry grew, so did The Cheshire Cat Software Company. The Cat, became well known for his convention antics, strutting about in Tabby ears and a striped tail, much to the amusement of his followers and rivals alike. He had style and personality, was beloved and trusted by both his customers and his peers.

As time wore on the Cat's advertisements appeared on a grand scale in all the computer magazines. His software line was a cross section from major producers coast to coast. During these early days the Cat's reputation was well deserved. He cared personally for his company and a few mistakes got past him. More importantly, Cheshire Cat made money.

Meanwhile, he acquired production or distribution rights to everything that looked good. He was a consistent winner.

Then it went sour, but where? The culprit seems to have been the omnipresent big bucks business software market. A brilliant west coast CP/M author made a great package available to Cheshire Cat, Inc.—so the story goes—and the potential Kilobuck return required a multi-kilobuck investment. Translating the business package to BASIC and debugging it was a time-consuming, money-draining project that dragged on for months.

Authors Unpaid

Meanwhile, the software companies and authors of programs that made up Cheshire Cat's dependable line went largely unpaid—a situation which might have been tolerable, if it hadn't been for the bouncing checks.

Salesmen, hired to boost the Cat's sagging sales, left almost as soon as they arrived. In despair, programmers and other Cheshire staff departed, as even their paychecks were returned to them unpaid. Quality control spiraled downward to the point where cassette labels and documentation consisted of little more

than faded gray photocopies of better times. Tapes that had been very carefully produced in the past, crashed with increasing predictability, leaving dealers and customers frustrated and furious.

Cheshire Cat, Inc., if not the Cat himself, had become an industry joke and an industry paranoia in one stroke. The rumors began to fly. Cheshire was bankrupt, went one story. They were bootlegging everybody's software went another.

For those companies with bad Cheshire Cat checks to deal with, anger was mixed with a touch of sympathy for an old friend somehow gone wrong.

The Captain Takes Some Advice

A lovely and sensitive lady, one that this Captain respects, asked me recently, upon hearing about Cheshire's breakdown, "Why kick the guy, when he's down? Give him a break."

She's right of course. The Cheshire Cat's not a bad sort.

Kick him! No, there's no vendetta here, only the public's right to know the facts.

And the fact is, as of this writing, the Cheshire Cat is on the comeback trail. His business program is debugged, his inhouse programs are still competitive, and though he lost some programs, others are in production. But the talk of bootlegging and shady practices will no doubt persist for a long time.

If there is a lesson in all this, it would seem to be directed toward software producers and would be programmers. There is a tendency to place pedestals under those who are prominent in any field. When elevated to lofty heights even small mistakes can balloon into disasters.

Marketing computer software is a business, a sometimes cruel and demanding business that can swallow up the ill-informed and the unaware. It is not enough to be a good programmer. You must also be a salesman and crack Private Eye.

The Cheshire Cat Software Company has now disappeared from magazine pages. They sell only in-house software, and, though I feel, the Cat will eventually pay everyone who has a claim against him, his business will never be the same. It's sad. He was my friend and I liked him. ■

80 ACCOUNTANT

by Michael Tannenbaum C.P.A.

The major asset of most businesses is inventory. Purchasing inventory is probably the largest single use of cash, regardless of the nature of the product bought and sold.

The speed of its turnover has a major effect on the cash position of the business. A sales slowdown reduces the amount of cash that is available, and faster sales will liberate cash to pay increased expenses that can be expected during these inflationary times.

This is where a computerized inventory management system can be very valuable. By knowing your inventory and its sales history, a businessman can reduce inventory and the subsequent cash outlay by liquidating slow moving stock while increasing his gross by concentrating on those items which move best.

IMS by Radio Shack

Recently Radio Shack introduced an Inventory Management System for the Model 11, catalog #26-4502, that represents a significant

improvement over the ICS available for the Model 1.

It requires a 64K Model 11 system with one disk drive, and a line printer capable of printing 132 characters per line (such as the Line Printer I, or 111). IMS stores 3,000 stock items, and features a rapid review of current inventory status.

The program takes full advantage of the screen capabilities of the Model 11. Extensive editing and maintenance options are available with screen formatting, which makes these controls easy to use. The system offers comprehensive ordering and receiving including multiple orders of the same item. It has a rapid and easy-to-use sale-posting routine. Sales transaction, inventory and ABC code analysis reports are printed.

The system also has provisions for a 200 name vendor file, and a complete vendor listing. To aid in maintaining the inventory, the

Continue to page 32

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80 ACCOUNTANT

From page 30

system generates physical inventory worksheets and automatic file up-dates.

IMS represents automation of a concept of inventory management that is used by many large corporations. Basically, it ranks sales according to volume. The top 20 percent of items sold in terms of sale dollars are classified as category A, the next 30 percent as B, the next 20 percent as C, the next 20 percent as D and the bottom 10 percent as E.

During the first year, the system requires that you enter an estimate of sales by item as its base. Consequently, if your estimate is off the system reports will be off.

After one year actual sales figures will be used and the reports will be more useful.

The ability to stratify sales by volume is an excellent tool when a stable stock is maintained. If you generally stock the same items, this system will allow you to concentrate your dollars in items which will generate the highest sales volume. Items with the lowest demand will become apparent in the E category very quickly.

Unfortunately, this system does not work well if there is an uneven demand for your product. In these cases another type of inventory control is required. Such IMS features as the inventory location, the profit earned on sales, and other activity reports are still useful.

Changing Price

From an accounting point of view, IMS offers a significant improvement over the ICS system on the Model I. The effects of changing price in the master file are spelled out in the manual. When merchandise is received, the screen displays the current price on file and allows you to change it.

However, the manual cautions you that you have just changed a unit price, and thereafter, all reports will use the new price. If you change the price each time a new item is received, the inventory cost on the IMS system will approximate Last In First Out inventory valuation. However, this system is clearly not intended to be used for accounting inventory valuation.

Perpetual cost and perpetual selling price is calculated based on sales and receiving data. Take warning—the perpetual selling price may not be the actual selling price. IMS does not accommodate selling prices other than the standard price on the master file.

When sales are entered, only the unit sales are entered. IMS prices those sales for you. If the actual sales price is different, it will be necessary to alter the master file price before recording the sale. Only if this is done will the IMS sales figures balance to the sales journal.

Another problem can occur during sales entry. Sales are entered by batch and these can be edited prior to posting. In batch entry control, totals should be used to guarantee the accuracy of the entry process. But there is no edit to insure the stock number entered is valid and the sales entry subroutine does not generate any control totals.

In the event of a data entry error, the update or posting run must be made before the error is identified. If there is no match between the stock number entered and the inventory master file, an error message is indicated on the transaction register, and the entry is ignored. If a greater quantity is entered than is present on the master file, then the entry is also ignored.

If sales transactions are not posted promptly, data entry errors can remain undetected for some time. If you delay the entry of receiving

paperwork, obviously, your sales figures will be inaccurate.

Despite problems, the Inventory Management System represents a major stride forward for Radio Shack. With the proper controls installed, it can prove an effective inventory management guide for the small businessman. I hope Radio Shack will follow-up with an IMS designed for a fashion or seasonal business that will utilize some of the super features of this program. ■

80 REMARKS

From page 8

up Exidy and the Sorcerer. Personal Micro Computer, Inc., is the new name of Microsette Co. The plans are to sell the PMC by mail. Obviously, it will take some time to build a dealer and service network, though a start, via the Exidy sales, has been made.

IBM Emerges . . . Slightly

The first approach of IBM to the microcomputer market was to back off and wait. And, too, there were some worries among the top brass about the effect of government regulation should they take over the micro market as they had the larger computer markets. This earlier dominance was bringing enough heat.

Not much happened until Tandy (Radio Shack), a firm with a good marketing plan, got into the field. Tandy's first year of production was sold out in a couple of weeks and they have been playing "catch up" ever since.

Tandy down-played their success, not wanting IBM and other big firms to know what was happening. They issued very modest statements on production. But the corporate balance sheet told the story for anyone used to reading those

things. Despite a disaster in CB and a serious downturn in hi-fi sales, Tandy reported record sales that had to be coming from somewhere. IBM began to move.

Every now and then rumors in the trade press reported that IBM was entering the microcomputer market. Word leaked out that they would be showing their personal computer system at an upcoming show, but somehow the expected system never materialized.

I flew to Germany in mid-April and drove to Hanover, in the North Central part of the country. Here they hold a week-long fair every year where nearly every product made or sold in Germany is on display. There are 23 buildings on the fair grounds, and the attendance is usually well over 500,000 people. Many of the firms exhibiting have permanent exhibits and pay \$75,000 or more a year for them—all for that one week show every April.

I had my first good look at the new IBM Personal Computer. Full color. I took some pictures just to prove that there was such a beast. I'll try to get more data on the unit for you.

The IBM looks first rate. The color is good and it has its own monitor. But will IBM muff it?

The recent articles about Texas Instruments, for example, and the TI-99/4 seem unanimous in dismissing them as a serious contender in the micro computer market. *Fortune Magazine* has run several articles on the subject and I don't know of anyone in the industry who disagrees with the evaluation made by *Fortune*. Texas Instruments is proof that even the biggest of them can make horrendous mistakes. ■



From that hint at Hanover, I traced the TRZ to an office in Amstelveen, Netherlands. It was now being called the Video Genie System, definitely a Hong Kong type of name. No matter, it looked like it might have great possibilities in the right hands.



After looking for over half-a-year, I finally found the mythical Hong Kong TRZ-80! Here it was at an industrial fair in Hanover, Germany.

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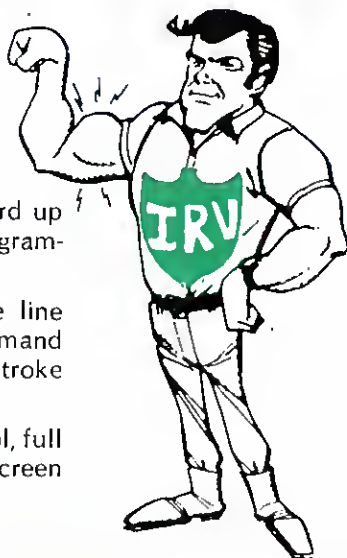
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Disk Editor

Disk Editor is a powerful machine-language utility program that will allow you total access to ANY byte of information in ANY sector in ANY track of your diskettes. It is a fast, simple, and efficient method of modifying files, whether BASIC program, system programs, or just data. All commands are readily accessible, with no need to refer to a command table.

With Disk Editor you can examine, alter, add, and delete information with ease. Information can be retrieved from the disk by supplying track and sector information, or by giving the filespec. You can even search the disk for a specific string of characters (up to 8 characters long).

If you need hardcopy, use the LINE-PRINT command to send a copy of the video display to your lineprinter.

You can transfer command from Disk Editor to Radio Shack's DEBUG and back, allowing dynamic debugging of disk I/O procedures.

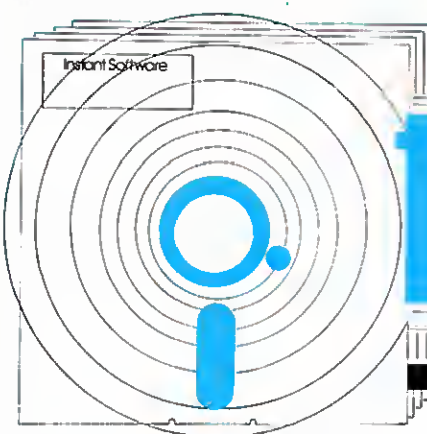
Disk Editor is compatible with TRS-DOS 2.1, 2.2, and 2.3, as well as with Apparat's NEWDOS. It is even capable of reading disks made by Percom's MicroDOS.

There are two versions of Disk Editor; one is for a 35 track DOS, and the other is for a 40 track DOS. Both are included in this package.

This package requires the following minimum system:

1. A TRS-80 Level II with 16K RAM.
2. An Expansion Interface.
3. A single Disk Drive.
4. Any compatible Disk Operating System. (Disk Editor is not compatible with VTOS 3.0.)

Pkg. 0180RD (disk-based version) \$39.95.



Disk Scope

- Fileloc
- CDisk
- Password

Need to check out a disk? Perhaps you want to see how the files are stored, or you forgot your password. No problem! You've got Disk Scope.

If you know the name of the file, the Fileloc program will show you what tracks and sectors on the disk contain that file, as well as how much memory the file takes when loaded into RAM. This works for both program and data files. Fileloc then allows you to print the information, restart the program or exit to BASIC. The information obtained allows you to use the CDisk program effectively.

CDisk is a powerful little BASIC utility and test program. It will allow you to view any track and sector on your disks in ASCII, Hex and screen POKES. It

totally disregards protection codes. It can also be used to randomly check all 350 sectors of your disk for read errors.

You don't know the whole file name if you haven't got the password, so the Password program has been included in the Disk Scope package. This machine-language utility not only gives you a password for files, but for whole disks as well.

Whether you're a novice or a pro, if you use a disk system, you need Disk Scope.

This package requires the following minimum system:

1. A TRS-80 Level II with 16K RAM.
2. An Expansion Interface.
3. A single disk-drive.
4. Any compatible Disk Operating System.

Pkg. 0139RD (disk-based version) \$19.95

*A trademark of Tandy Corporation

Instant Software™

Prices subject to change without notice.

PETERBOROUGH, N.H. 03458
603-924-7296

Instant Software™ **New Releases**

FOR THE ARMCHAIR PILOT

Introducing two NEW software packages for those who yearn to fly. These four simulations can take you from instrument landings to night-time photo-recon missions, you can be a bush pilot or an air traffic controller. We're Instant Software—Fly us!



Night Flight



May, 1941—The dreaded Nazi battleship, the Bismarck, has broken out of the North Sea and is now somewhere in the North Atlantic. Your mission is to make a nighttime photo reconnaissance flight over the Bismarck. These photos will help the Admiralty determine the extent of damage done to the Bismarck in a previous battle and whether the British fleet has a chance to sink the German pocket battleship.

The Night Flight program lets you take-off, fly, and land a propeller driven aircraft. You can practice approaches

and landings with a full on-screen display of the landing field. Or, you can go on a mission, follow the radar vectors to your target, and get your photo (hopefully returning safely to your airbase without being shot down).

This program simulates the flight characteristics of a real aircraft with pilot input for all flight maneuvers. During the flight, you are supplied with a real-time stream of flight information, navigational aids, glide-slope markers, and landing field information. The instructions with this program can practically teach you to fly.

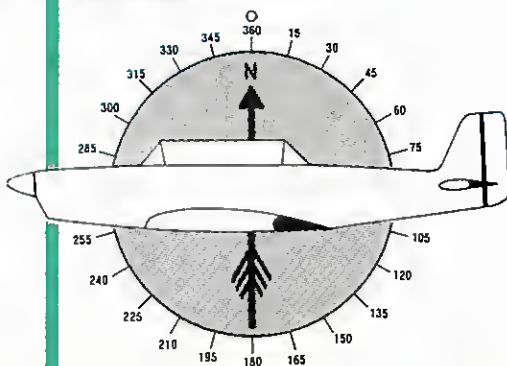
Somewhere out on the cold, gray North Atlantic, the Bismarck tries to elude her pursuers. Your photos are vital. Launch yourself into the night sky with the Night Flight package.

Order No.0117R. \$9.95



Flight Path

- Mountain Pilot • O'Hare
- Precision Approach Radar



The Flight Path package will let you experience all facets of modern day aviation.

Mountain Pilot transforms you into a daring bush pilot as you fly badly needed supplies to a remote gold mining camp. You'll have to cross a hazardous mountain range, while struggling with headwinds, tricky navigation and rapidly diminishing fuel.

Watch your airspeed, altitude and rate-of-climb or you could stall-out and crash. If you deliver your supplies, you can't relax; you must return over those mountains with a heavy cargo of gold bullion.

O'Hare is a control tower simulation where you become an Air Traffic Con-

troller. The lives of hundreds of people become your responsibility as you guide aircraft through your control sector to a safe landing.

You'll have to deal with different aircraft requirements, wind change warnings and potential midair collisions. But no matter what happens, you must bring in twenty aircraft safely on your tour of duty.

Precision Approach Radar combines the skills of pilot and Air Traffic Controller. You become the pilots' eyes as they try to land in limited visibility conditions. Your commands guide the aircraft on their approach to the field—and a safe landing.

The Flight Path package covers both sides of flight procedure, from the thrill of flying to the tense drama of air traffic control.

Order No.0171R. \$9.95.

TO ORDER: Look for these programs at the dealer nearest you. If your store does not stock Instant Software send your order with payment to: Instant Software Inc., Order Dept., Peterborough, N.H. 03458 (Add \$1.00 for handling) or call toll-free 1-800-258-5473 (VISA, Master Charge and American Express accepted).

For a free catalog listing over 200 programs write: Instant Software Catalog Dept., Peterborough, N.H. 03458.

*A trademark of Tandy Corporation

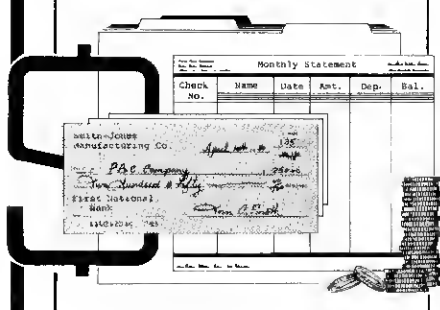
Instant Software™

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603-924-7296

Instant Software™ New Releases

FOR THE PRUDENT BUSINESSPERSON

Check Management System



CHECK MANAGEMENT SYSTEM

The Check Management System was created to provide you, the small business owner or individual, with a system for writing checks and maintaining records.

This program allows you to make check entries, edit or correct the entries, print the checks, and search and display check records by check number, code, date, description, or amount.

You'll be able to maintain a complete record of all your checks on disk for fast, easy access. You can record all your checks as you write them, have them automatically printed on fan-folded, pin/tractor feed check forms, and locate any specific check within one minute.

The program will do all the arithmetic for you, maintain a constant running balance, and, if you make a mistake,

allow you to correct your records without having to go through all the checks.

A Code command and Search routine allows you to print a list of all checks written for specific expenses. This is a great aid when tax time comes around.

The program can print check reports with your name or your business's name and account number at the top of each report.

This package requires the following minimum system:

1. A TRS-80 with 16K of memory.
2. An Expansion Interface with 16K of memory.
3. Two minidisk drives.
4. Any compatible Disk Operating System.
5. A pin/tractor-feed line printer.

Order No. 0147RD (disk-based version) \$39.95.

THE ONE-D MAILING LIST

Here is a one-disk mailing list system, with fast storage and retrieval for names and addresses. You have up to 17 categories of selection. Disk versatility allows you to add, delete, or change the numerous details stored in the system.

MAILING LIST FEATURES

- Automatically sorts names (alphabetically and by ZIP code).
- Rapid access to any name on file.
- Easy error correction and recovery.
- Prints selective name listings.
- Revise or up-date listings at any time.
- Up to 2500 names on-line (with 4 drives).

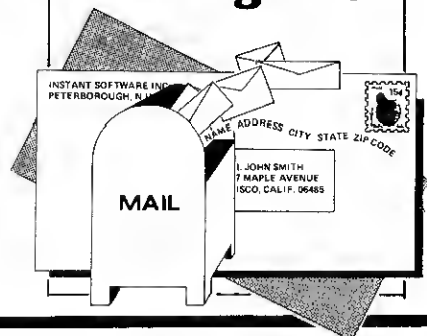
- Up to 17 mailing list categories.
- Prints a list of all names on file.
- Prints mailing labels.

The ONE-D MAILING LIST package is designed to be used with the following minimum system:

1. A TRS-80 Level II Microcomputer with 16K memory
2. An Expansion Interface with up to 32K RAM
3. A single disk-drive (with option for up to three additional disk-drives for extra storage space)
4. A line printer
5. Any compatible DOS for the TRS-80

Order No. 0123RD \$24.95

The One-D Mailing List



FOR THE INTELLECTUAL CHALLENGE

MIND WARP

Are you a problem solver? Do you enjoy narrowing down possibilities until you've reached a solution? Then the Mind Warp package is what you've been lusting for!

This two-part package includes:

- **Mind Twist**—A mastermind-type game but with a "twist." Try to guess the computer's secret digit sequence. The computer will score your guesses.
- **Mind Bender**—A multi-level game where you must ferret out the computer's secret code. You have a choice of deciphering a three, four, or five digit code.

It's no enigma, the Mind Warp package is for puzzle lovers everywhere. For the TRS-80 Level II 16K. Order No. 0118R \$9.95.



I Q TEST

Ever wonder what your I Q is? Well here is the chance to find out, in the privacy of your own home, and have fun doing it. With the I Q Test program, your TRS-80 will administer and score an intelligence test in a mere 30 minutes.

For variety, there are three equivalent tests, each consisting of 35 questions. These questions are designed to test your knowledge and problem solving abilities.

There are not too many of us who can justifiably claim to be a genius, but here is a chance for you to find out! For the TRS-80 Level II 16K. Order No. 0157R \$9.95.

Instant Software™

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More for Less.

Speed. Capacity. Price.

The Vista V-80 mini disk system is 8 times faster than the TRS-80, 23% more storage capacity, and costs only \$395.

Compare our performance to Radio Shack's TRS-80*. Then match our price with theirs. Then decide which one is for you.

Features

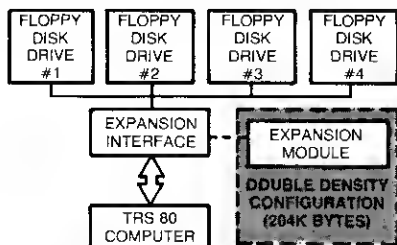
- Vista offers 102K bytes to Radio Shack's 89K. That's 13K more bytes per drive for Vista.
- The V-80 operates at 12ms versus 40ms for TRS-80. Our drive can operate at 5ms, but only 50% of TRS-80 will operate at that speed; therefore, Vista has purposely set the access time at 12ms.
- Totally compatible with all available disk operating systems.
- Upgraded system. Increased storage and speed patch supplied at no charge by Vista.
- Drives are interchangeable for any location from Drive 0—thru Drive 3.
- Immediate Delivery.
- **120 Day Warranty**

Prices:

Single Drive System\$395
Two Drive System\$770
Four Drive System\$1450

*TRS-80 is a registered trademark of Radio Shack, a Tandy Company

TYPICAL CONFIGURATION



Single Density Configuration (102K Bytes)



The Vista Computer Company 1401 Borchard Street • Santa Ana, California 92705 • 714/953-0523

Vista Expansion Module

The expansion Module provides a double density modification to your current Radio Shack interface that allows you to format diskettes in either single or double density. In double density format, your Vista Drive increases your storage capacity up to 204K bytes on a single 40-track drive.

To insure the highest performance possible, without compromise, we recommend that you use Vista disk drives in conjunction with our Expansion Module.* For a demonstration on your system call **TOLL-FREE 800-854-8017**

Price \$239.00 (includes all hardware and software)

*Vista cannot guarantee Radio Shack drives to operate 100% in double density.



Bigger Is Better.

Expandable storage. Greater Versatility.

The Vista Model II* Disk Expansion System provides one, two or three drives, and adds up to 1.5 million bytes of storage.

You say you want more disk storage, more programming versatility . . . at a reasonable price. Say no more. Our Vista Model II Disk Expansion System may be just the answer for you. Choose from 1, 2 or 3 drives, already mounted. Each additional disk drive will add about 1.5 million bytes of on-line storage to your system. Buy only what you need now. As your needs grow, you can continue to expand your capacity by adding another drive. It's that simple.

But the best part we've saved for last. The price. It's cheaper than Radio Shack, yet our Model II will do everything Radio Shack's expansion system can do. The only difference is our Model II will keep on working long after most others have stopped. That's why we are justifiably proud of our product's high reliability. And our **120-day warranty**. Actually, it's not hard to stand behind a product — that works — if you know what we mean.

*Model II is a registered trademark of Radio Shack, a Tandy Corporation.



COMPARE OUR INTRODUCTORY LOW PRICES

1-drive Expansion System	\$1,000	3-drive Expansion System	\$2,100
2-drive Expansion System	\$1,550	Additional Drives Only	\$ 525

NO WAITING • IMMEDIATE DELIVERY.

NAME _____	PLEASE ☒ ONE:
ADDRESS _____	☐ CHECK OR MONEY ORDER ☐ CREDIT CARD ☐ C.O.D.
CITY _____ STATE _____ ZIP _____	PLEASE CHARGE MY CREDIT CARD: _____
TELEPHONE (____) _____	☐ MASTER CHARGE ☐ BANK AMERICARD VISA
OPTIONAL COMPANY AFFILIATION _____	CARD NO. _____
TITLE _____	EXPIRATION DATE _____
INTENDED APPLICATION _____	PRINT EXACT NAME OF CARD HOLDER _____
	SIGNATURE _____

Item	Quantity	Price
Subtotal		
Calif. Res. add 6% sales tax		
Per-Unit Shipping and Handling (\$5.00 UPS - \$7.50 UPS Blue)		
Total		



The Vista Computer Company 1401 Borchard Street • Santa Ana, California 92705 • 714/953-0523 ✓65

80 NEWS

by Nancy Robertson

"The TRS-80 co-stars helping the world famous Good Guy in his fight against Evil."

Centronics Price Hikes

Centronics Data Computer Corp., Hudson, NH recently raised prices on most of their printers, parts and services.

Centronics printers which are compatible with the TRS-80 are the 730 and 737 models. Prices of these models were increased by six percent, bringing the suggested retail price of the 730 to \$795 and the 737 to \$995.

Parts for the 730 and 737 models were raised eight percent in price. Service, other than carry-in, was raised 10 percent. Carry-in service rates have not changed. ■

Mailgrams Can be Transmitted by TRS-80s

The TRS-80 Level II can now be used to send Mailgram messages. Mailgrams are an existing service offered jointly by Western Union Electronic Mail, Inc. (MUEMI) and the U.S. Post Office. Initiated electronically, the hard copy is delivered anywhere in the 50 states with the next business day's mail.

The advantages of Mailgrams have been considered to be their speed, compared to regular mail delivery, and their cost, compared to telegram rates.

Tandy Corp. has developed a Mailgram package and negotiated with WUEMI to arrange access to Mailgram services for TRS-80 users via a toll free telephone connection. Message storage of text, mailing lists, etc., is also available.

Accounts must be established with WUEMI if you wish to use the service. Rate sheets and service agreements for accounts are included with Radio Shack's Mailgram package. Account customers will have lower rates than the general public.

If the WUEMI account is not approved, the Radio Shack package may be returned for a full refund. The request must be made within 60 days of the purchase.

The minimum system required for the Mailgram package and service is a 16K Level II with an expansion interface, RS-232-C serial interface board and Telephone Interface II. ■

NJ Personal Computer Show and Fleamarket 80

The New Jersey Personal Computer Show

and Fleamarket will be held Saturday and Sunday, Sept. 27 and 28, at the Holiday Inn (North) Convention Center, Newark International Airport.

The show is designed with residents of New Jersey, Connecticut and New York state in mind. It is being promoted as a show for hobbyists and small businesses.

Besides the traditional indoor sales area, there will be an outdoor fleamarket.

Indoor or fleamarket exhibition/sales space may be reserved on a first come first serve basis. Indoor booth space costs \$180, including table, chairs and electric current. Fleamarket space cost \$7 per day.

Contact Kengore Corp., 9 James Ave., Kendall Park, NJ 08824 for further details. ■

Help the Staff

Help stave off the visual impairment of the 80 staff. A recent study conducted by the editors links the rise in myopia among 80 employees with the influx of single-spaced verbiage.

Help the fight against myopia—send your material to 80 DOUBLE-SPACED. Or give to 80 Fund for Bifocals.

Thank you.

Microsette Becomes Personal Micro Computers

Microsette Co. has changed its name to Personal Micro Computers, Inc., to reflect its expanded product line. The company will be offering peripheral products as well as continuing to produce Microsette blank cassettes and Microsette program duplication services.

New products from the company include Fastload, Joy-80, ROM Extender and Pro-80. Fastload is an interface between the



TRS-80 and Superman comic book

TRS-80 Guards Metropolis

Superman has inhaled poisonous kryptonite crystals and his super human powers are fading.

How will he save Metropolis from the evil designs of Major Disaster? How will he rescue the crashing jetliner, turn the flood waters back to their basin and contain the nuclear accident at the Metropolis power plant?

This is a case for . . . TRS-80.

Radio Shack and the creators of Superman, D. C. Comics, Inc., have teamed up to produce a Superman comic book, "The Computers that Saved Metropolis." The TRS-80 co-stars, helping the world famous Good Guy in his fight against Evil.

Radio Shack considers the comic a teaching aid. It is available free from them at Advertising Dept. CC-1, 1300 One Tandy Center, Fort Worth, TX 76102. ■

CTR-41 recorder and the TRS-80 parallel port which loads standard tapes 16 times faster than the usual baud rate.

Joy-80 is an analog-to-digital converter which may be used as a joy-stick for games or an input device for light level sensing, voice input and sound sensing, etc.

ROM Extender plugs into the TRS-80 to decode and access unused 2K space in the memory map. It is possible to gain up to 2014 bytes for common machine language programs.

Pro-80 is a prototyping printed circuit board with a 40-pin connector for assembling

peripheral circuits, such as those which are printed in computer magazines.

All of these products are add-on peripherals for the TRS-80 Model I, Level II. For further information write Personal Micro Computers, Inc., 475 Ellis St., Mountain View, CA 94043.

Reader Service ✓ 160

Lowercase and Symbols Generator

CG-16, a lowercase and graphic symbols generator for the TRS-80, is available from G. P. Ass., P.O. Box 22822, Sacramento, CA 95822.

It provides video display of lowercase letters with descenders for word processing, electronic symbols, game symbols and, for video graphing or graphics, thin line graphics and half-tone characters.

CG-16 is compatible to all disk operating systems, Level II and Disk BASIC with modifications. It comes fully assembled and with installation instructions, however, installation requires soldering jumpers and cutting traces on the circuit board.

The same video memory chip required for the electric pencil is needed for CG-16. It can be ordered separately for \$18.50. CG-16 costs \$94.50.

Reader Service ✓ 179

TRS-80 Playing in the Band with The Music Box

The Music Box is a hardware/software tool that plugs into the TRS-80 keyboard (or the expansion interface extension bus) to produce music and sound effects.

With the box attached, you can play up to four notes simultaneously within a seven octave range. The sound can simulate up to four different instruments at a time. Sound effects, such as explosions, gun shots and phasors, are

also possible.

The Music Box includes a volume control, a 400 mW power amp and a phono jack for connection to external speakers.

Software is supplied on Level II cassette. The minimum hardware required is 32K Level II.

The Music Box is sold for \$252 from Newtech Computer Systems, Inc., 230 Clinton St., Brooklyn, NY 11201.

Reader Service ✓ 169

Summer Computer Camp

Rancho OSO Computer Camp will open this summer in the mountains above Santa Barbara. With a ratio of one computer per two campers, the camp will be open to youngsters ages 10 to 15.

Computer topics will include programming in BASIC, games and educational films. More advanced campers will work with floppy disks, color graphics, computer generated speech and music, robots and COBOL, APL, RPG and Pascal programming languages.

Activities will be balanced with traditional summer camp activities such as horseback riding, tennis, swimming and hiking.

There will be five two-week sessions beginning June 22, July 6, July 20, Aug. 4 and Aug. 17. The cost per session is \$795. Contact Computer Camp, Inc., 1235 Coast Village Rd., Suite G, Santa Barbara, CA 93108 for further information.

Reader Service ✓ 180

Model II Editor Assembler

EDAS 4.0 has been released by Galactic Software, Ltd. It is a RAM-resident text editor and assembler for the TRS-80 Model II running under TRSDOS. The editor provides text editing facilities for the modification of alphanumeric text files. Command syntax is identical to the Model II's Disk BASIC editor. EDAS is capable of text block move, global change,

string search and line scroll.

The assembler portion facilitates the translation of Z-80 symbolic language (ZILOG mnemonics) source code programs into machine code. Assembler switches provide the user with options to suppress source and symbol table listings, suppress object code generation, and to output the assembled code directly to memory or disk, among other things.

All TRSDOS commands can be executed from within EDAS. This feature gives you the capability of displaying directories, listing files, setting FORMS, or entering other commands within EDAS. Interfacing to DEBUG has been provided to enable a direct approach to debugging user generated code.

EDAS is available with the instruction manual for \$229.00 from Galactic Software, Ltd., 11520 N. Port Washington Rd., Meguon, WI 53092. *Commands & Parameters*, an additional manual, is available for \$29.00.

Reader Service ✓ 161

Taped-based Word Processor

G. B. Ass., P.O. Box 3322, Granada Hills, CA 91344, is selling a cassette-based word processor for the Level II with 16K or more memory. The word processor is compatible with RS's Line Printer II and Centronics 730 Printer.

The program includes entry from keyboard or cassette, line edit, scroll, save to tape and line print. The user may select right-justified margins, line length to 80 characters, upper/lowercase, expanded characters, adjustable margins and text centering.

It is priced at \$19.95.

Reader Service ✓ 162

Direct-connect Modem

Emtrol Systems, Inc., 1262 Loop Rd., Lancaster, PA has a direct-connect phone modem which eliminates the need for a separate expansion interface, an interface board and a tele-



The Music Box



Lynx direct-connect modem

phone coupler.

The Lynx has the ability to transmit and receive. The instruction manual describes time-share access methods such as The Source, CBBS, Forum-80 and TRS-80 to TRS-80 links.

Including a terminal cassette program, the instruction manual and power pack, the Lynx modem costs \$239.95.

Minimum hardware requirements are Level I or II 4K RAM.

Reader Service ✓ 174

MMSFORTH Data Management

The Datahandler is an interactive data base management utility, running in MMSFORTH on a Model I with 32K RAM or more and disk drive. Datahandler runs in conjunction with the MMSFORTH system disk.

The package is suited to single disk drive use because the program area is software write-protected, while the data file is left open. The disk may be removed once its program is loaded to be replaced by a data disk.

The manufacturer claims that typical multiple-field sorts on 100-record files take five seconds, while look-ups take less than one second.

Datahandler with manuals costs \$62.90 by mail order. The MMSFORTH system disk costs \$79.95. They are available from Miller Microcomputer Services, 61 Lake Shore Rd., Natick, MA 01760.

Reader Service ✓ 167

Accessing ROM by the Book

The Book: Accessing the TRS-80 ROM, Vol. I is the first of three volumes on machine

The Book

and assembly language access to the Level II BASIC ROM.

This volume details the mathematic subroutines and data formats, including all logarithmic, trigonometric and arithmetic operations. A fully commented listing of the routines and a complete memory map, which describes the 500 plus memory locations, are included.

Volume One is available at local computer stores or from Insiders Software Consultants, P.O. Box 2441, Springfield, VA 22152 for \$15.45 including postage.

Reader Service ✓ 170

Mail Label Package

Labelmaker, which has the ability to code each record and selectively printout labels by a user assigned code, is available from The Peripheral People, P.O. Box 524, Mercer Island, WA 98040.

The program offers rapid entry and error correction. Names can be sorted in memory alphanumerically or by zip code in less than 10 seconds. Printout is in tabular form on label stock. There is a provision for a test run for label alignment.

System requirements are at least one disk drive and a minimum memory of 32K. The package costs \$99.50. The company offers a full refund if the product does not perform as promised.

Reader Service ✓ 166

UCSD Pascal for Model II

PCD Systems, Inc. is releasing UCSD Pascal for the TRS-80 Model II. The standard package includes an interactive operating system with run time support routines, a

P-code interpreter, a compiler, a screen editor, a character-oriented editor, a Z-80 macro assembler, a linking loader and a patch/dump utility program.

The package also offers the ability to read and write single- or double-density diskettes in most standard formats, a diskette formatting program, a program to configure serial I/O ports and a module which can copy screen data directly into a Pascal memory array.

The operating system requires the 64K Model II, and may be purchased from PCD Systems, Inc., P.O. Box 143, Penn Yan, NY 14527.

With documentation including the *UCSD Pascal User's Manual*, Jensen and Wirth's *Pascal User Manual and Report*, and Ken Bowles' *Beginner's Guide for the UCSD Pascal System*, it costs \$350. Without manuals or texts, it costs \$300.

A turn-key package which includes P-code interpreter and BASIC I/O system alone is \$85.

For an additional \$50 each, a TRSDOS-to-Pascal file conversion, a CP/M-to-Pascal file conversion and a Z-80 disassembler/dump program are also available.

Reader Service ✓ 177

Mod II Text Editor Is a Word Processor

Text Editor for the Model II is available from Computer Bugs, P.O. Box 789, Boynton Beach, FL. The word processing system requires a 64K system with one disk drive and costs \$39.00. It contains all the features of their Model I Text Editor that was announced earlier for \$29.00.

Features include upper and lower case, the ability to move, copy or delete a line or paragraph, inserting or replacing lines, finding or changing a word or phrase, and merging multiple lines or paragraphs.

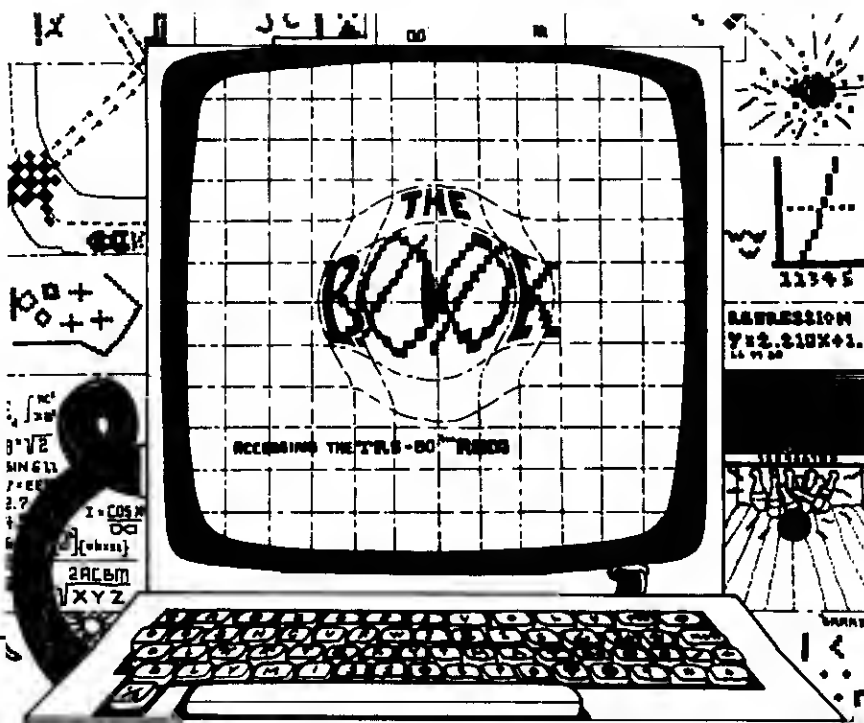
Print control commands may be optionally inserted into the document to control the formatting as it is being printed. Thus, several different formats may exist within a single document such as a right justification, varying line length and indentations, single or double spacing, varying page lengths, and printing and centering of double sized characters.

Reader Service ✓ 172.

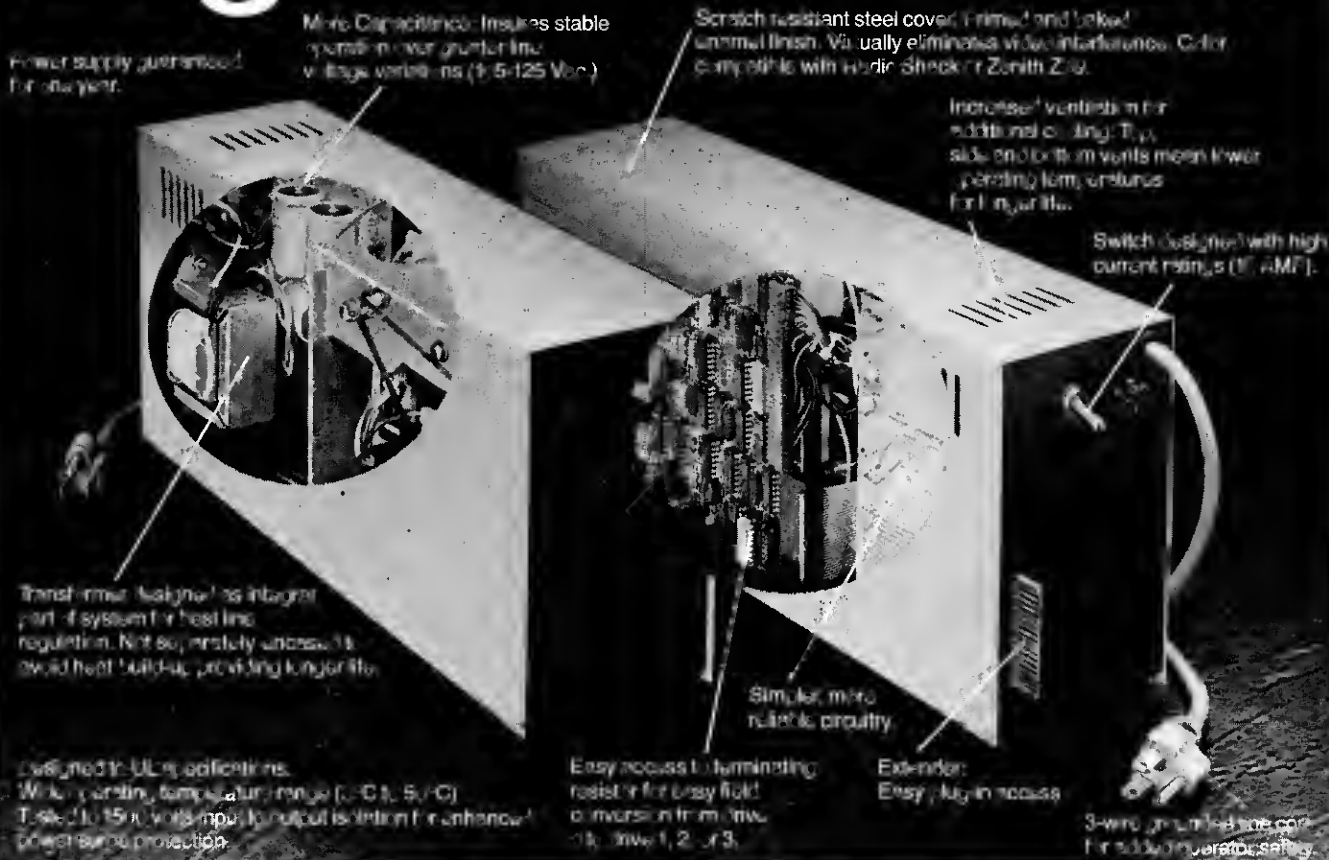
Model II Cartridge Disks

Cameo Data Systems is shipping a TRS-80 Model II Adapter for the Cameo DC-500 Cartridge Disk Controller. The new DC-504 Model II Adapter allows attachment of up to four 2½-20 M-byte cartridge drives, adding a very large database capability to the TRS-80.

Cameo believes the benefits of cartridge disks are especially important in business applications. Removable cartridges facilitate multi-generation backup, which are needed to recover from program or operating errors, and can



Precision Engineered Drives...



With the number of disk drives on the market increasing, more and more people are beginning to ask what's underneath that cover.

The CCI™ series of disk drives have been designed for long life and ease of operation. The features shown above are what set our CCI drives apart from the rest. With a CCI drive you get an integrated professional design!

If you're still not convinced that you get the most for your money with a CCI drive, just ask for our complete specifications sheet. Then, compare our disk drives to anyone else's.

5 1/4" DRIVES

CCI-100	40 Track (102K Bytes) for TRS-80* Model I	\$399.00
CCI-189	40 Track (102K Bytes) for Zenith Z89	\$499.00
CCI-200	77 Track (197K Bytes) for TRS-80* Model II	\$675.00

8" DRIVES

CCI-800	77 Track (1/2 Meg Bytes) for TRS-80* Model II	\$895.00
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All CCI drives are also available for 220 Vac (50Hz) operation.

Operating Systems

NEWDOS Plus for 5 1/4", 40 and 77 Track Drives—with over 200 modifications and corrections to TRSDOS	\$110.00
CP/M for Model I, Zenith	\$150.00
CP/M for Model II, Altos	\$199.00

Software by S&M Systems

INSEQ-80™—Indexed Sequential Access Method (ISAM) for the TRS-80 Model I.

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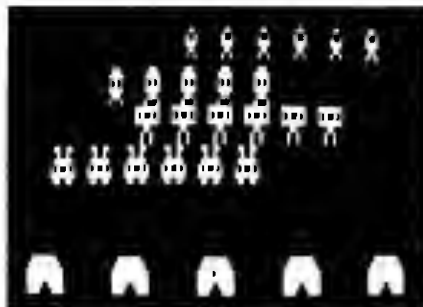


be used for archival storage as well. The utility of the microcomputer is also extended by the ability to simply exchange databases from one set of applications to another.

Cameo Data System, Inc., 1928 S. Anaheim Blvd., Anaheim, CA 92805, is selling the DC-500 Controller, DC-504 Adapter, and all cables together for \$1500.

Reader Service ✓ 173.

Two Graphic Games



Alien Invasion

Software Innovations has released two TRS-80 Level II 16K games. Cosmic Intruders is a machine-language space game with sound effects. It is a real time game in which the player must destroy alien space creatures in his gun sight.

The program retails for \$9.95.

Alien Invasion is the latest TRS-80 version of Space Invaders. The player must shoot down aliens while evading the bombs they drop. A new feature is the gradual movement of the aliens toward the player. Speed, sound and graphics have been improved.

It sells for \$9.95 from Software Innovations, 320 Melbourne Rd., Great Neck, NY 11021.

Reader Service ✓ 182.

Personal Finance and Auto Leasing Packages

Small Business Systems Group (SBSG) is marketing the Deluxe Personal Finance Package and a software package for auto leasing companies.

The auto leasing package programs provide vehicle maintenance files, account maintenance, monthly billing and report generation.

Besides balancing your checkbook, Deluxe Personal Finance provides monthly summaries of income VS spending, estimate and average monthly expenses, calculate profit or loss and provide data summaries by category.

The Deluxe Personal Finance Package requires the TRS-80 Level II 32K with two disks.

The auto package requires the same equipment plus a line printer.

Contact SBSG, Corner Main St. & Lowell Rd., Dunstable, MA 01827 for further information.

Reader Service ✓ 175

Two Adventure-type Games

Dungeon Explorer 2.0, for the TRS-80 Level II with at least 16K, is a revision of the earlier game Dungeon Explorer. A single player tries to become a super-hero by battling monsters within the Dungeon of Xanadu.

The revisions have improved the command input routine (using INKEYS) and combat sequences, and added more monsters and mapping graphics.

Cosmic Trader is a game of interstellar trade. Up to four people try to amass a fortune by commanding their own star freighter in a quadrant consisting of nine star systems with nine categories of trade goods.

Both programs are sold on cassette for \$13.95 by Simulation Software, P.O. Box 1368, Warren, MI. Owners of the original Dungeon Explorer can have their programs updated for \$4.

Reader Service ✓ 183.

BASIC Translator

Structured BASIC Translator (SBT), sold by Acorn Software, Inc., is a utility which helps programmers write structured programs.

The elements are PROCEDURE, CALL, CASE-CALL, IF-THEN-ELSE, WHILE and UNTIL. There are no line numbers and no GOTO's.

After a programmer writes a structured program (which may require structure elements, comments and BASIC statements), SBT converts the file to a BASIC program.

The translator written for disk-based Level II systems can translate its own code in less than four minutes.

SBT is sold for \$29.95 by Acorn Software, Inc., 634 North Carolina Ave., S.E., Washington, DC 20003.

Reader Service ✓ 176

Fast LOADs and SAVEs

Hisped is a new system program for the TRS-80 designed to reduce the amount of time required to SAVE, VERIFY and LOAD BASIC and system programs, and/or array data. Its transfer rate is 260 bytes per second which is about four times faster than normal. However, when SAVING, VERIFYing or LOADING array data, Hisped's effective transfer rate is up to 30 times faster than normal (based on 10K of ar-

ray data).

In the normal transfer process, each time a PRINT# or INPUT# statement is executed by a BASIC program a new leader is written on tape and it takes a lot of PRINT# statements to SAVE a large amount of data.

The program requires 870 bytes of protected memory in Level II 16K, 32K or 48K, and is available now for \$25.95 from Palomar Software, 170 S. Palomar Dr., Redwood City, CA 94062.

Reader Service ✓ 168.

Standard Tax Program

CPAids has converted its Federal Tax Software to run on the TRS-80 Level II with at least two disks and 64K.

It includes federal tax forms 1040; 1040A with schedules A, B, C, D, E, G, R/RP, SE and TC; forms 2106 and 2441; sales tax tables; tax tables A, B, C, D; tax schedules X, Y, Z; and instruction manual.

One and three percent medical limitations are incorporated. There are also automatic checks for FICA over-withholding, earned income credit and dividend exclusion.

Federal Tax Software is priced at \$495 from CPAids, 1640 Franklin Ave., Kent, OH 44240.

Reader Service ✓ 181.

System Carrying Case

Computer Textile, Inc., 10969 Wilshire Blvd., Los Angeles, CA 90024, is selling a TRS-80 system carrying case.

The case has room for the keyboard module, expansion interface, two disk drives, power strip, two boxes of diskettes and manual. It is lined with foam rubber for protection and finished with vinyl and velvet for appearance. It weighs about 17 pounds.

Most cabling does not need to be detached for packing, and the system may be operated in the case.

It is priced at \$179.

Reader Service ✓ 171

Carrying case



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A single 1½" by 2" PC board plugs into the expansion connector on the TRS-80 keyboard or the screen printer connector on the expansion interface. This board contains the electronics required to convert the computer output into a high fidelity audio signal. Just plug in the board and connect to the aux/tape/tuner input of any audio amplifier. No external power supply is required.

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Ken Vianello is the principal of the Fort King Middle School in Ocala, Florida, and not only does he believe in the importance of the computer and its impact on the future, but he also acts on his beliefs.

If anyone had told you ten years ago that an eighth grade class in computer education would be the most popular course at that grade level, you might have concluded he was a prime candidate for the "funny farm." Not so! Here, at Fort King a computer education course in BASIC is, in fact, most popular with the eighth graders.

The course is taught in a computer laboratory equipped with 16 Level II TRS-80's. Perhaps even more amazing than the fact that such a facility *does* exist in a middle school, is the story of how the lab came to be.

Irregular Channels

Shortly after his appointment as principal of this middle school (grades 6 through 8), Ken Vianello, convinced that computers were here to stay, laid the groundwork to prepare students for the impact of these devices.

As Vianello observed, "We in education are notorious for reacting but never acting. If the prediction is true that over 40 million microcomputers will find their way into our homes in the next decade, then it makes good sense to start now to train our young people in the practical applications of this equipment."

The funds for this project were not available through regular budget channels, so Vianello elected to raise the money through the sale of spices. With the enthusiastic support of the parents and students, some \$19,000 worth of

"sneeze-proof" pepper, "cryproof" onions, seasoning salt and bacon bits were sold, providing sufficient profits to finance the program.

In the early part of 1979, with the spice drive funds in hand, Principal Vianello, hopeful that the program could be operational for the 1979-80 school year, assembled his staff, Ms. Jane McClellan, Curriculum Supervisor and Ms. Holley Griffin, a Math Teacher with a flair for computing.

They purchased fifteen Level II 4K TRS-80 units after reviewing most of the microcomputer equipment that could do the job within their budget limitations. Renting, leasing and time sharing arrangements were considered and subsequently discarded, since future budget appropriations could jeopardize the program.

Computer Carpentry

The Fort King Middle School has an enrollment of 1100 with a faculty and staff of 57, yet they found time to build a computer lab. Yes, it was built from scratch—for where else could one find an eighth grade computer laboratory? Moreover, the only space available to house the facility was a multi-level lecture hall that required considerable carpentry work to convert it into a flat-floored lab. Virtually all the lecture hall furniture was adapted for use as computer work desks, saving considerable expense.

If any of the staff were skeptical, they have long since joined the ranks of the believers.

Let's make one point very clear: The course is not elective—it is required of every eighth grade student! And there are 350.

Each student receives eighteen weeks of instruction, in two nine-week segments, separated by a nine-week break. With five 50-minute periods per week, the course provides nearly 75 hours of classroom time.

Despite the fact that the course is required, to date, Vianello reports, only five youngsters have been lukewarm to cool in their reactions to the training, and only two of these asked to be excused.

For the majority of students, the course has



Photo 1. Principal Kenneth Vianello, Ft. King Middle School, Ocala, FL



Photo 2. Teacher Holley Griffin (standing); (L to R) Kim Backer, Mary Garr, Leann Brucks, Susan Martz

been a success. School starts at 8:00 AM. Ms. Holley Griffin, who teaches five of the daily classes, usually arrives about 7:00 AM, hoping for a few minutes alone at her newly acquired TRS-80 Level II with disk drive. Invariably, two or three youngsters are already there waiting for her to open the lab. By 7:30 AM most of the first class of the day is on hand with all keyboards in use. After the final class of the day, there are some enthusiasts who must be literally pried loose from the keyboard.

Why is the course so successful?

It's probably a variety of things, not the least of which are good teaching methods, coupled with high student interest. Classroom work is assigned according to the student's capability. In general, two students of comparable ability share the use of a TRS-80.

Grading is on the satisfactory/not satisfactory basis, so none of the students are made to feel they are struggling for a particular grade.

Learning Levels

While most of the pupils are permitted to set their own pace, the high achievers are given additional classroom work and homework on a much tighter and structured schedule. This group is required to turn in fully documented special assignments at least every two weeks.

Ms. Griffin and Ms. McClellan combined their talents to prepare some project material, tailored to the three student learning levels: the gifted, the average and the low achievers. Space does not permit a complete list, but a few from each category are outlined below.

1. Gifted or Advanced Student Projects

- Write a program which asks a person his or her weight; print that person's equivalent weight on each of the planets and the moon.
- Develop a program which translates an alphabetic message into Morse code.
- If you put P dollars into a savings account with an interest rate R, compounded T times a year, how much money would there be in the account at the end of N years? Write the program so that it answers the question for any combination of the

parameters P, R, T and N. Now use the program to determine the amount A after one year, starting with \$100 at 5 percent interest when it is compounded (1) annually, (2) semi-annually, (3) quarterly and (4) daily.

- You are about to purchase a car. Assume you normally drive 10,000 miles per year and use EPA mileage ratings from 10 miles per gallon (MPG) for a heavy luxury car to 40 MPG for a small economy sedan. Write a program which lists, in three columns, the MPG from 10 to 40, the gallons of gasoline used in one year and how much that gas costs using a current local price for unleaded gas.

2. Average Student Projects

In this category Ms. Griffin has provided eight pages of projects and problems to give the students some good programming practice. Students are asked questions, such as:

- How would you correct it to make it run right?
- How would you modify it to make it a better program?
- Compare two programs shown; tell which you prefer and why.
- Take a listed program and make your own adaptation.

The program guide provides a number of examples to apply to the above practice work.

A section in the Average Student Guide asks the student to translate some word problems into BASIC programming formats. They are asked to copy the finished program on a BASIC Coding Sheet, remembering the steps for developing a program: (1) Feed in the data, (2) Provide an equation (formula) and (3) Print the answer.

Most of this exercise, for the average student, involves taking word problems in arithmetic and converting them into computer language. For example:

- A carton of soft drinks costs 98¢, and a doughnut costs 12¢. What is the total cost of three cartons of soft drinks and ten doughnuts?
- A family drove 2,300 kilometers one summer. The next summer, they drove 1,084 kilometers. How much further did they drive the first summer?

3. The Low Achievers

For this group seven pages of simple program exercises for copy practice on the TRS-80 keyboard have been prepared.

- 10 LET X = 100/4 + 75
20 LET Y = 200/20
30 PRINT X/Y
40 END
- 10 REM * ADDITION PROBLEM *
20 READ A,B,C,D
30 LET E = A + B + C + D
40 PRINT E
50 DATA 25, 3, 17, 12

Teacher's note: Remember how we got rid of the "O.D. error" in another program we did?

- 10 PRINT " MY COMPUTER IS A WHIZ AT ARITHMETIC"
20 PRINT 5 + 2 * 4 + 3
30 PRINT 8 - 16/32
40 PRINT (5 + 2) * (8 - 3)
50 PRINT "THAT'S ALL FOLKS!"
60 END

It was this third group that surprised school authorities. These youngsters have an extremely short attention span, and they cause discipline problems in many classrooms. Not so here in the computer lab!

When one of these students sat down at the TRS-80 keyboard, he seemed transformed into a totally different student. His interest in the short programs he was given to copy was quite intense.

After copying a number of simple programs, some of these pupils even dream up programs of their own. The following program was written by one of the youngsters:

```
10 FOR I = 0 to 1332
20 N = RND (1023)
30 PRINT X,"**";
40 NEXT I
```

"Students have . . . called the machine an idiot or a dumb-bell, but they do not get mad . . . when it tells them they are wrong."

Teaching Technique

Ms Griffin's expertise in math, coupled with some computer training, made her an ideal choice for her position. In addition to some of the teaching material she has developed herself, she makes liberal use of various TRS-80 manuals including the new *Learning Level II* by David A. Lien. The lab's reference shelves contain a number of publications which the students can consult at any time. A dozen tape sets of the Radio Shack's Learning Level II (Part I) are available and in constant use. Part 2 of this program will be on the shelf in the near future.

In the laboratory, Ms Griffin has the usual chalk board and overhead projector, which are used to explain and demonstrate various steps in BASIC programming. Considerable material is on transparencies and can be readily copied by students on their keyboards from the projection screen.

Ms Griffin has a TRS-80 Level II with disk drive at her desk. In progress is a project to interface this machine with six 19" TV sets distributed throughout the lab. The staff is currently wrestling with a TVI problem generated by the unshielded keyboards of the TRS-80, so at the moment the monitors are not in daily use.

The Computer Education Program has been well received and enjoyed by the students and there have been few disciplinary problems. Interest in the course is spreading in a contagious way! Members of the faculty, parents and other outsiders have indicated a desire to learn more about microcomputers, as a direct result of student enthusiasm.

At least one adult education class is using the laboratory for an evening computer course in BASIC. There have even been inquiries from county and city service departments concerning training programs for employees. If the de-

mand persists, Ken Vianello's ingenuity may well be tried again.

What about Service?

What about equipment problems?

In general, the staff feels they have received good service and support from the two Radio Shack stores in Ocala.

Local store managers have graciously cooperated by loaning a keyboard or two during repairs. No serious interruptions have occurred because of equipment failures.

The keybounce problem was quite evident at one of the adult evening classes we attended,

seventh graders have shown considerable interest in the course and are impatient to get "with it" in the next year or two. Computer education may become commonplace in countless middle or junior high schools in the country.

Several Ocala families have purchased microcomputers for the home as a direct result of the interest sparked by this forward looking program at the Fort King Middle School.

An adult class is using the lab for a Central Florida Community College course in BASIC, and many of them have microcomputers on order. The senior members of the class are just as enthusiastic as the younger members.

The use of the microcomputer as a patient teaching aid has just begun. Youngsters are able to accept that the computer cannot forgive mistakes and will not tolerate sloppy or faulty instructions.

Students have, in exasperation, called the machine an idiot or a dumb-bell, but they do not get mad at the TRS-80 when it tells them they are wrong.

Progressive educators like Ken Vianello and Jane McClellan are providing the direction and leadership for this innovative experience in education.

Teachers Tommy Parker, who works with a group of gifted youngsters, and Holley Griffin are, in a real sense, pioneers in this field, and their contribution will not go unrecognized.

As a result of the excellent work of this group and the efforts of others in this dynamic venture, we can look forward to an interesting future with the computer as a willing helpmate. ■

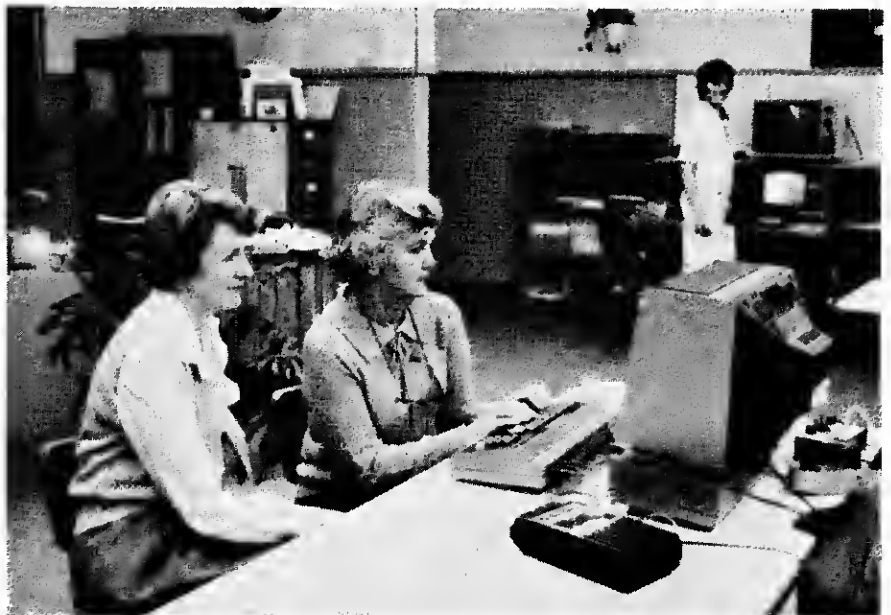


Photo 3. (L to R) Teacher Holley Griffin, Curriculum Coordinator Jane McClellan, Mark Payne (background)

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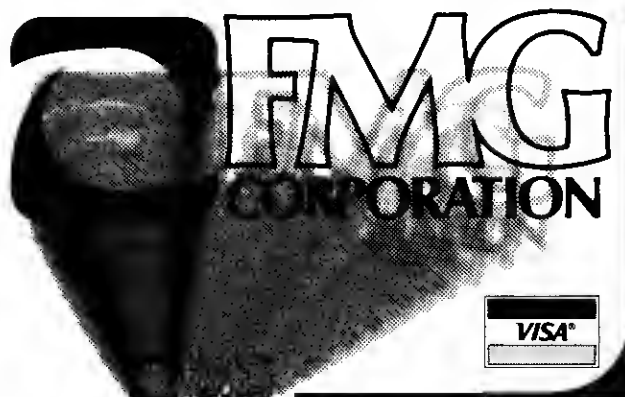
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- Business arithmetic version of Pascal/MT is also available
- Pascal data structures supported are: ENUMERATE, IN, OUT, RANGE, TYPES, RECORD, ARRAY, RECORD, INTEGER, CHAR, pointer, LEAN, MATH, arithmetic, SETS, GET, PUT

PASCAL/MT includes compiler and a real time symbolic debugger. The system requires 32K minimum and 2 mini disks or one 7 disk.

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In Profile — Scott Adams.

How the Gamesman Began

by Nancy Robertson
80 Staff

An advanced computer programmer one day came across a game about adventure and hidden treasure played on a mainframe computer. The game, by Crowther and Woods, changed his life. The programmer is

Scott Adams.

After playing the mainframe game many times, Adams went home and wrote his own adventure game for the TRS-80. He called it Adventureland.

Since then, Adams has written eight more adventures, marketed all nine, sold over 20 thousand of his games and started his own software company in Longwood, FL. He is 28 years old.

Fan mail and phone calls have come from 10-year-old kids and members of a California Adventure Club that have exchanged their weekend poker games for weekend adventures. One college professor even uses the games to improve the logic of his business students.

But games did not originally attract Adams to computers.

Educated in Computer Science

Before Adventureland, his professional experience was in technical applications of large memory computers. At Florida Institute of Technology, where he received his B.S. in Computer Science, he was first employed in the computer center where he eventually improved their ledger and payroll programs. Later, he worked as a computer consultant for the physics department.

He has worked on a civilian contract with the U.S. Air Force in its Space Object Identification project and has written a classified paper on computerizing radar analyses. Working on another government contract, he helped design computerized flood control for West Palm Beach. It was the first computer application to flood control in the country.

When you take a look at his personal interests, Adam's professional switch to writing games for microcomputers isn't so surprising.

When Radio Shack and Tandy first announced that they would be bringing out the TRS-80, Adams had a Sphere home brew micro and had written an assembly language and designed a graphics board for the same firm. He hadn't thought the TRS-80 would find a market, but he bought one anyway.

Because the system was reliable and broke down less often than his own, Adams had more time to develop programs. When it became apparent that the computer was selling, he helped start three of the first 80 clubs.

Programmer Scott Adams, Author of Ghost Town.



"For the price, they're still the best system available," Adams said.

"Their biggest problem comes from the inflexibility of the Radio Shack, or Tandy, corporate structure—their inflexibility in their approach to marketing hardware. They're tied to Radio Shack outlets.

"They ought to let privately owned computer stores, that are already in existence and have the experience, sell their product. At Radio Shack stores they're used to selling hifis and don't know much about computers. It seems to me they should offer the Model II, especially, through local stores."

Adams called the Radio Shack Computer Centers "company landmarks" rather than computer information centers. But he emphasized that the product itself, the TRS-80 computer, is good.

"I think it will still be in use 10 years from now, which is saying a lot in an industry that is changing so quickly."

Besides his interest in micros, Adams has always been a games freak and a science fiction fan. He has a personal library of nearly 3,000 volumes, most of which are sci fi. Before computer games were available, he played Stratego, Contact 4, bridge, etc. One of the games for microcomputers that has interested him recently is Word Challenge by Richard Taylor.

Back in 1978, Crowther and Woods' game excited him, he said, because it combined the challenge and logic of a good game with the imagination of storytelling and it was computerized.

Wanting to explore the same possibilities on a microcomputer, Adams wrote his first adventure. He devised a split screen, which he still uses in all his adventures. The top portion states the player's location, visible objects and possible exits. Using two-word English sentences (verb and object), the player types instructions and answers questions which appear on the bottom section of the screen.

The Adventure

The player must explore the land to devise a map, find and save treasures and hope to escape alive. At the beginning, you have no idea what the treasures are or what words the computer will accept. Every discovery comes through trial and error with the help of logic and imagination.

When Adams wrote his first adventure in the summer of 1978, "it was 95 percent then, what it is now," he said. "In fact, it was just about all there, except the speed."

He showed it to friends at home and took it around to the TRS-80 clubs. He hadn't expected much reaction, but everywhere he went, people were enthusiastic. Finally, he decided to show it to Lance Micklus.

"He's well established as a programmer, and he had more knowledge about the market than I did." After several months of "gentle nagging" from Micklus, Adams rewrote the

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BASIC program in machine language.

"I thought it was all right the way it was. People seemed to like it. I didn't think they cared about speed. But Lance kept saying I should make the change. I didn't get around to it for a long time, maybe six months. But I finally did it. Looking back," said Adams, "I realize it made a big difference."

After transposing Adventureland to machine language, Adams wrote what he called his own adventure language. He described it as quick and flexible, and spoke about it with an excitement that was carried by his tone. With the new language, the new game-like concept and more ideas for other games, Adams began his own company.

"Adventure International became an entity around March of '79, but I had been developing programs for it since the beginning of the year." Most of the time between January and March, he spent working on revisions and refinements.

That's the way it generally goes with these games, Adams explained. "I had the original one up and running within two weeks of getting the idea. I spent the next six months reworking and elaborating it."

Pirates Adventure, Mission Impossible (to avoid a nuclear power accident), Voodoo Castle, The Count (Dracula), Strange Odyssey (a space adventure), Mystery Funhouse, Pyramid of Doom and Ghost Town followed Adventureland.

Adams said, "I tend to lean toward The Count and Mystery Funhouse (as favorites). There's no particular reason, except, it may be because it felt good writing them."

Programs for Adults

Graphics are noticeably absent from any of the Adams' game. But he does not consider this a drawback.

"People ask me about that," he said, "and they also ask about adding maps. But figuring out your own map is part of the game. I do expect to add new features, but I'm thinking more in terms of sound effects."

"Most people tell me they supply their own images, their own pictures in their minds." He explained that these programs are like computer novels as much as they are like computer games. They are played by a single person who must draw on his imagination.

"If you go to a bookstore and look through the children's books, of course they have pictures. But books written for adults usually don't have any drawings. What a person can supply in his mind is so much better than what I could give them on the screen."

In the past, none of his material has been researched. Adams has been writing to thrill his audience and to indulge his own sci fi whims and adventure fantasies. But he is looking in new directions. He is beginning to research the underground railroad as it existed just prior to

the Civil War. His next adventure may revolve around this network, which smuggled runaway slaves to freedom.

Adams is enjoying his lot. In his free time, there are novels to read, games to share with his wife, Alexis, and the Orlando sunshine.

Alexis helps with the business. The Adamses expect Adventure International to continue to expand, offering utilities and recreational software, written by several programmers. Com-

pany software will keep pace with advancements in hardware, Adams asserted.

In the Future

Adams hopes to concentrate his own business time on what was once a lark and has since become a creative obsession: the adventure series.

"Sometimes I sweat blood trying to get the original idea worked out and down. Other times it just flows." ■

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That's why I still answer the phone. And why, I guess, people say all those nice things.

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The BASIC Switchyard

Gene Perkins
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A computer, given the same set of instructions and data, will always arrive at the same conclusion. A railroad train, given the same track and switch settings, will always arrive at the same destination. This predictability of the results enhances the value of both computers and trains. But there are other similarities as well.

The computer programs which you write normally consist of a series of statements. The statements in programs form a path or track down which the ROM interpreter travels to carry out your instructions. The interpreter proceeds from statement to statement, branching or switching to new tracks at the IF statements, taking side roads at GOSUB statements, circling occasionally in FOR-NEXT loops, and finally stopping at an END or STOP statement.

Determine the Path

Within each statement the sequence and type of operators also determine a path which the interpreter must follow. For example, the following two BASIC statements will give quite different results:

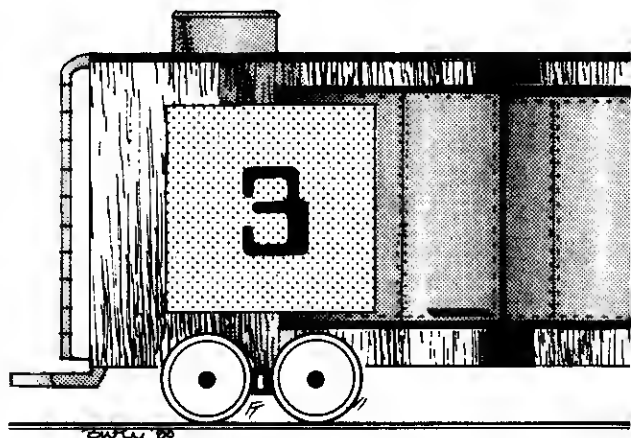
$A = 5 + 6 * 2$
 $B = (5 + 6) * 2$

Here A will be set to 17 while B will be set to 22. The difference is due to the different sequence of operations.

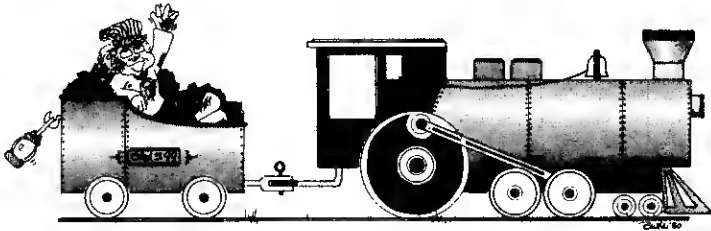
But did you ever wonder how the interpreter knows which operations to perform first? In the first statement above, why was the multiplication done before the addition? Sure, you and I know that multiplication and division are performed before addition and subtraction, but how does the computer make this decision?

One approach would be to scan each line looking for operations which have high priority or precedence and carrying out those operations first. But such a technique would require saving a large amount of information and/or rescanning the statement several times.

What is needed is a method which requires only one scan of the statement, has relatively little overhead, and is simple to implement. The method described below is used, in one



“... ever wonder how the interpreter knows which operations to perform first?”



form or another, by almost all interpreters and compilers for many different programming languages. An analogy to a railroad switchyard is used which should make the method easy to understand and remember.

Notation

First, let us define a few basic terms. An “operator” is a symbol which indicates what type of operation is to be performed. An “operand” is the thing which will be operated upon. Thus, in the BASIC statement $A = 2 * \text{COS}(R + 4) - Y/3$ the operators are:

$= * \text{COS} + - \text{ and } /$

The operands are the variables A, R and Y; and the constants are 2, 4 and 3. The parentheses are used only to control the sequence of operations, but will be treated in what follows as operators.

When the human eye scans this statement to select the proper sequence of operations, it sees that the multiplication cannot be done until the cosine of $R + 4$ is calculated, and, further, that the cosine cannot be calculated until the sum of R and 4 is computed. Scanning further to the right, we note that it is not Y that is to be subtracted from the first result, but rather it is the quotient of Y divided by 3.

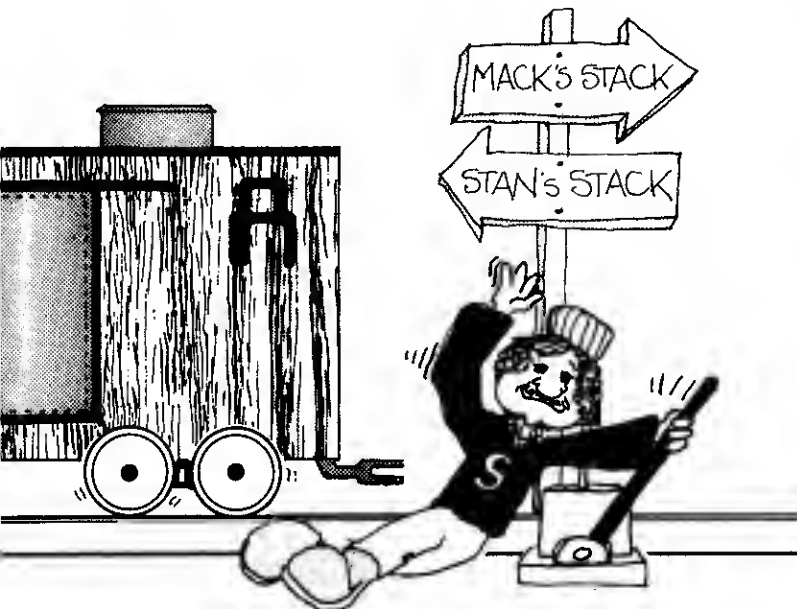
The knowledge used in making these determinations is that operators have precedence. This must be expressed in numbers to the computer. The higher the number the sooner that operation will be performed. A typical precedence scheme is given in Table 1.

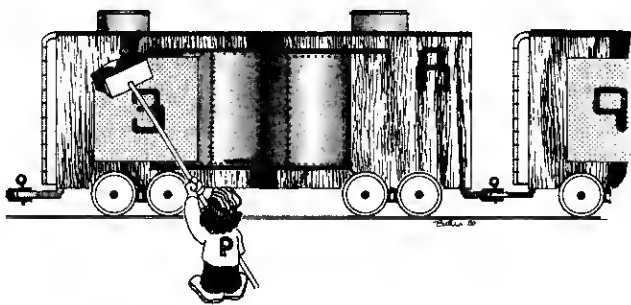
Most people are used to “infix” notation. This notation places the operator between its operands, as in $R + 4$. If we were all in agreement, we could just as easily use “postfix” notation such as $R 4 +$. Or we could use prefix notation: $+ R 4$. In fact, we do use prefix notation for many functions. For example, the function $\text{MAX}(X,Y)$ could be written as $X \text{ MAX } Y$. On the other hand, we could convert our infix terms such as $Y/3$ to the prefix form $\text{DIV}(Y,3)$ or $\text{QUOTIENT}(Y,3)$. In this way the BASIC statement given above could be written:

`ASSIGN(A,SUBTRACT(MULT(2,COS(ADD(R,4))),DIV(Y/3)))`

The same statement in postfix notation would be:

$A 2 R 4 + \text{COS} * Y 3 / - =$





Evaluating Postfix

It is important to distinguish between binary and unary operators. No, a binary operator does not operate only on binary numbers. A binary operator must have two operands, while a unary operator has only one operand. To evaluate the above postfix statement the following rules are used:

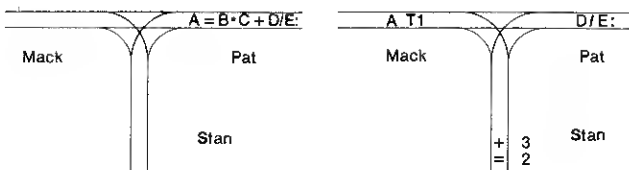
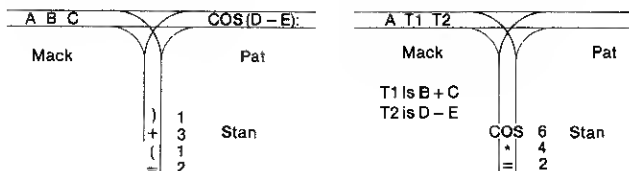


Figure 1. The three workers are in place ready to interpret a statement.

Figure 2. Mack has transformed $B+C$ into T1.

Figure 3. Stan will now send the $+$ to Mack, discard the parentheses, and then stack the $*$.

Figure 4. Stan sees the colon, so he will send all the remaining operators to Mack.



1. Scan from left to right until an operator is found.
2. If it is a binary operator, perform the operation on the two operands immediately to the left. (If it is a unary operator, use only the one operand to the left.)
3. Remove the operator and its operand(s) from the list, replacing them with the result of the operation.
4. Repeat from step 1 until the list is empty. (The operator $=$ causes the result to be stored in A and the assignment is complete.)

These rules will cause the statement to be reduced, as shown in Table 2.

This is a very simple and efficient technique. The problem now becomes: How can we reassemble the BASIC form of the statement into the postfix form? For the solution, let us turn to the railroad switchyard, which has many years of experience in reassembling strings of railroad cars.

Let us assume that the operands and the operators of the BASIC statement represent the cars of a train entering the switch yard from our right. First, we will need a side track which will allow reversing the sequence of some of the cars. In Fig. 1 the train consists of the statement $A = 2 * \text{COS}(R + 4) - Y/3$. A colon has been added as a caboose.

Now as the train arrives with the A at the head, the three switchmen, Pat, Stan and Mack, have been given very explicit instructions.

Pat's instructions are: If the car is an operand, set the switch so that it goes straight ahead to Mack. If the car is an operator, mark the precedence of the operator on the car and send it to Stan. Pat understands that he is to send no cars to Mack or Stan until they are ready for them.

Stan's instructions are: As a car approaches from Pat, note the precedence number written on its side. If the number is greater than the number of the last car in Stan's "stack," push all the cars farther down the stack and add the car to the stack.

If the number is less than the number of the last car, send the last car from the stack to Mack. Keep sending cars from the stack until it is empty or the next car in the stack has a number which is less than the approaching car's number. Then let the approaching car enter the stack. (Initially the stack was empty, so Stan just accepts the first car. When Pat signals that there are no more cars, Stan starts sending Mack all the remaining cars from the stack one by one.)

Mack is the workhorse of this operation. Mack's instructions are: Consolidate all the cars into one car! But he can't consolidate cars without an operator. So he keeps accepting cars from Pat and Stan until he gets an operator. If the operator is binary, he carries out the required operation on the last two operands received and places the results on one car, switching the other two onto a siding.

If the operator is unary, he just consolidates two cars into one. When he gets down to one car, he knows the train is finished (because this is such a well planned operation) and he sends the single car off to be stored in memory. (When he gets a one-car train marked END, he goes home to ROM.)

Now let's see how this works on a simple example, such as:

$$A = 6 * C + D/E$$

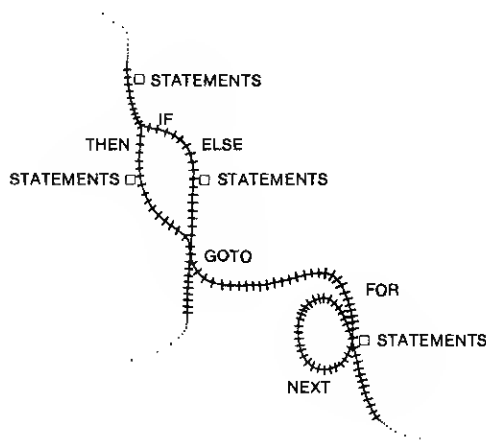


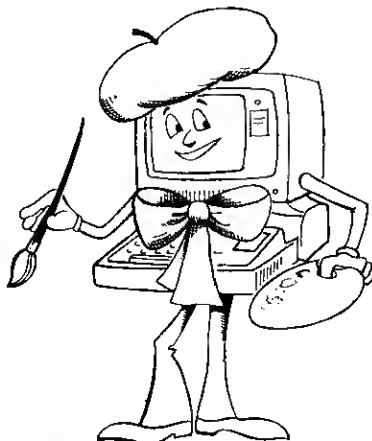
Figure 5. Some statements control the flow through the program.

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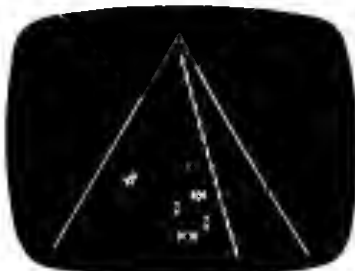
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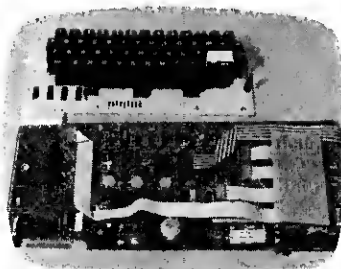
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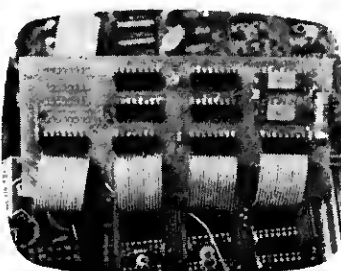
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Precedence	Operator
7	functions
6	+ and - (unary)
5	[(exponentiation)
4	* and /
3	+ and - (binary)
2	= (assignment)
1	(and)
0	;
	(end of statement)

Table 1. Operations with higher precedence are performed first.

Instruction Sets

Draw the diagram in Fig. 1 on a piece of paper. Move the cars around according to the following steps:

1. Pat sends A to Mack because it is an operand.
2. Pat marks a 2 on the side of the = card and sends it to Stan.
3. Stan places the = in the stack because the stack is empty.
4. Pat sends B to Mack (who is still waiting for an operator).
5. Pat marks the * with a 4 and sends it to Stan.
6. Stan notes that the 4 is larger than the 2 already on the stack so he pushes the = down and adds the * to the stack.
7. Pat sends the C to Mack (still waiting).
8. Pat marks a 3 on the side of the + and sends it to Stan.
9. Stan sees the approaching car has a 3 on it which is less than the 4 on the top of the stack so he pops the * off the stack and sends it to Mack. Since the 3 is greater than the 2 of the = which is now at the top of the stack, Stan places the + on the stack.
10. Mack, at last, receives the operator * from Stan and performs a multiplication on B and C, places the result on the B car (renaming it T1), and switches the C car and the * car off the track. The situation is shown in Fig. 2.
11. Meanwhile, Pat sends the D toward Mack, marks the / with a 4, and sends the / to Stan.
12. The 4 on the / is greater than the 3 on the +, so Stan pushes it onto the stack.
13. Pat sends the E to Mack, marks the caboose (;) with a 0, and sends it to Stan. Pat waits for the next train (statement).
14. Stan sees the 0 on the approaching caboose and quickly sends the /, the +, and then the = to Mack.

15. Mack gets busy and performs the division operation on D and E creating a new car called T2. Mack's cars now consists of A, T1 and T2.

16. The + arrives, and Mack adds T1 and T2, getting T3. Mack now has A and T3.

17. When the = arrives, Mack performs a store operation placing the contents of T3 into the memory location reserved for A. Mack now waits for more cars, since he did not get a STOP or END.

New Rules

To handle parentheses, Stan needs two new rules: (1) always place a (on the stack regardless of the precedence of the object on the top of the stack; and (2) when a) arrives, pop all operators on the stack and send them to Mack until a (is found. Then discard the matching (and).

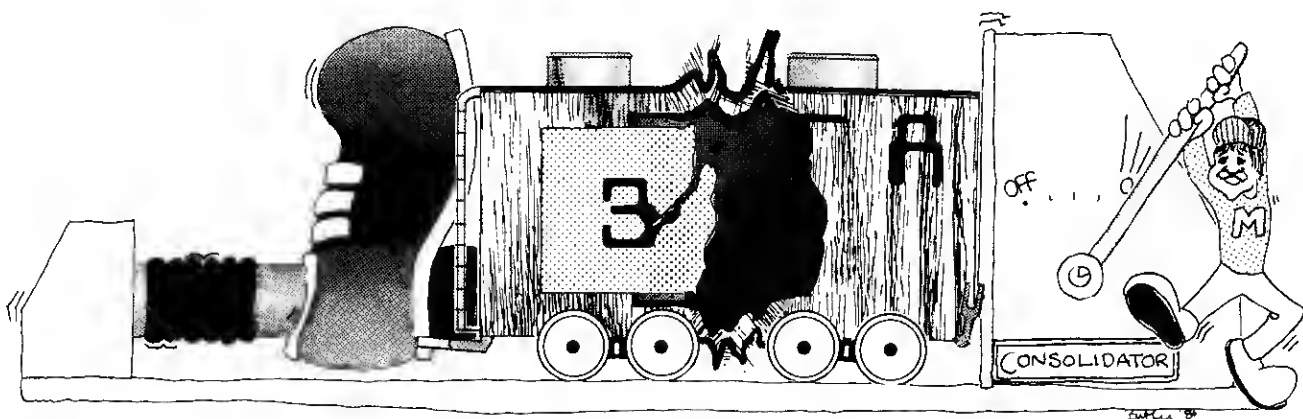
A	2	R	4	+	COS	*	Y	3	/	-	=	
A	2		T1		COS	*	Y	3	/	-	=	T1 is R + 4
A	2		T2		*	Y	3	/	-	=		T2 is COS(T1)
A			T3			Y	3	/	-	=		T3 is 2 * COS(R + 4)
A			T3				T4		-	=		T4 is Y/3
A							T5			=		T5 is T3 - T4

Table 2. Sequence of postfix operations. The last operation is to store T5 in A.

Now we can try the statement: $A = (B + C) * \text{COS}(D - E)$. Remember that COS is a unary operator with precedence 6. Figs. 3 and 4 show two of the intermediate states in interpreting this statement. In Fig. 4 the next step is to send COS to Mack who will take the cosine of T2, giving him T3. This will give him the operand stack A, T1 and T3.

Other types of statements, such as IF-THEN-ELSE and FOR-NEXT, may be processed in a similar manner. It is primarily the operations performed by Mack which are different. That is, some of the operations cause a change in the program counter (which determines which statements are to be interpreted), rather than computing a result. See Fig. 5.

Some computerists use their computer to control their model railroad layout. As we have seen, it may be a case of one railroad system controlling another. ■



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number of man-hours that were required just to calculate the value for linear dials.

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For each increment of X you must now calculate: 1) the corresponding value of Y; 2) the meter deflection in electrical

units at each increment; 3) the angular deflection of the meter pointer at each increment and; 4) all of the above for each alarm point.

Fig. 1 gives a typical example of this problem. The X and Y coordinates are expressed in terms of gallons versus tank depth.

The following program was written in BASIC programming language for use with Radio Shack's TRS-80, Level I computer. It can be easily modified for use with Level II systems, if a printout is required. The program will use 3409 bytes of memory if typed exactly as shown in Program Listing 1.

The program asks for all perti-

nent information. See Fig. 2. There are a total of 16 questions, but not all of them may be nec-

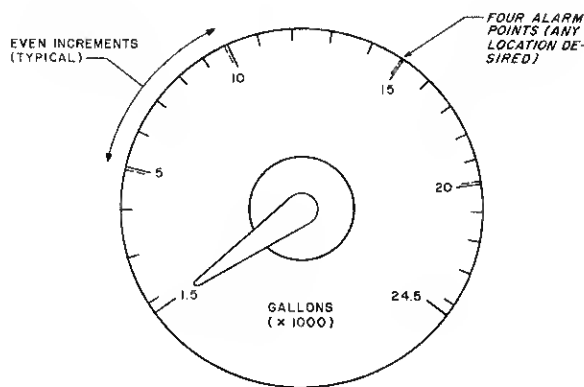
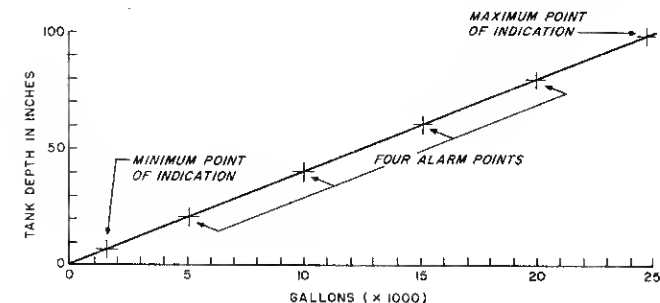


Fig. 1

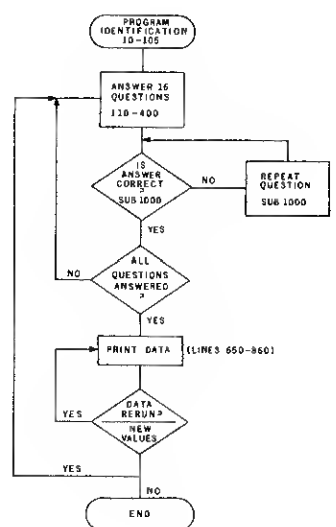
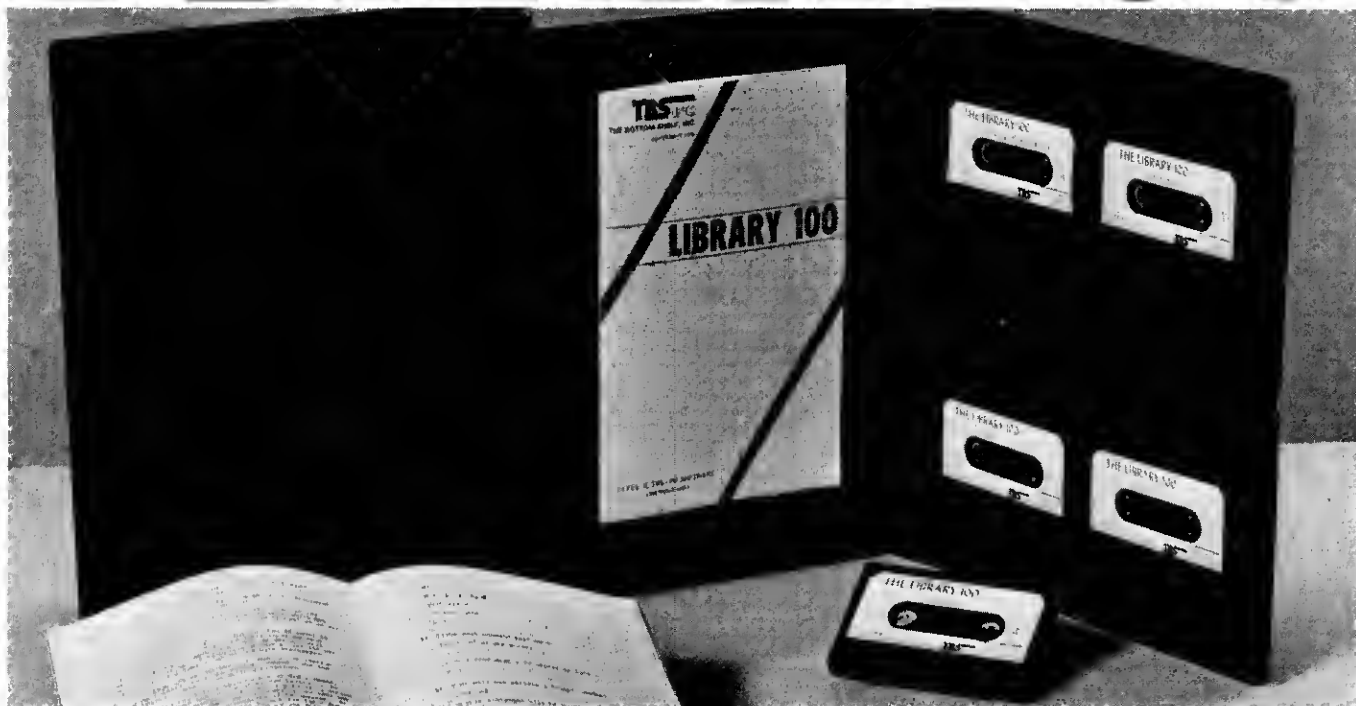


Fig. 2

- A = Highest level indicated (Gal/Lit).
- B = Lowest level indicated (Gal/Lit).
- C = Highest level indicated (Inch/Met).
- D = Lowest level indicated (Inch/Met).
- E = Increment required (Gal/Lit).
- F = Full scale deflection of meter in microamps.
- G = Full scale deflection of meter in degrees.
- H = Integer (A/E). (Sets up number of loops.)
- I = Job number.
- J = Date.
- K = Number of alarm points.
- L = Decision command to correct incorrect entry.
- M = Used to continue the program at line 580.
- N = Timing chain and logical decision. See lines 890-920.
- O = Used in subroutine to test answers.
- P = 1st alarm point.
- Q = 2nd alarm point.
- R = 3rd alarm point.
- S = 4th alarm point.
- T = Not used.
- U = Not used.
- V = Not used.
- W = $Y \cdot G / F$. (Calculates angular deflection in degrees).
- X = $(Z - B) \cdot ((C - D) / (A - B)) + D$. (Calculates the value of tank depth relative to gallonage).
- Y = $(Z - B) \cdot F / (A - B)$. (Calculates meter deflection in electrical units).
- Z = Integer (B/E) * E. Establishes 1st increment value.
- Z = Z + E. Establishes each additional increment within the FOR-NEXT loop.
- AS = Customer name.
- BS = Dial identification.

Table 1. List of Variables

LIBRARY 100



The **LIBRARY 100** from TBS is without doubt the greatest software bargain ever. Released in November 1978, it has sold thousands in 44 countries. Written for the TRS-80, **LIBRARY 100** contains 100 programs on five tapes. Most of the programs can be run on a 4K, Level II computer. Designed to be a basic computer library, it provides a series of programs over a broad range of topics. All programs but one are written in **BASIC** and can easily be modified to suit your own purposes.

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"...a basic computer library for the hobbyist, parent or businessman." *Kilobaud Microcomputing, December 1978.*

The programs are spread over five general categories; Finance, Education, Graphics, Home and Games. As an added bonus, the **LIBRARY 100** contains Tiny PILOT, a condensed version of the high level language primarily used in education. It is perfect for teachers, parents, students and sales trainees. Using only six commands, even a child could be programming in minutes. The other programs are as follows:

FINANCE: Present Value of Future Sum, Simple Interest for Days, Future Value of Present Sum, Amortization Schedule, Interest Rate-Compound Interest, Interest Rate-Installment Loan, Days Between Dates, Term of Installment Loan, Present Value of Series of Payments, Real Estate Investment Analysis, Nominal-Effective Interest, Internal Rate of Return, Future Value, of Regular Deposits, Regular Deposits for Future Value, Depreciation (Amount, Rate, Salvage Value, Schedule), Bond Present Value, Bond Yield to Maturity, Sale-Cost-Margin-Day of Week, Moving ad.

EDUCATION: Multiplication & Division, Addition, Subtraction, Fraction & Decimal, States & Capitals, States and Order of Entry, States and Date of Entry, States and Abbreviations, Inventors and Inventions, World Capitals & Countries, Urban Areas and Population, Authors & Books, Presidents and Order, States and Largest City, Base Numbers.

GRAPHICS: Front Cover, Wierd, Rat Race, Random Ad, Fireside, Left-Right Ad, Blocks, Herring, Launch, Blinker, Snoopy, Snow, Step Ad, Step Ad Two, Graphic Words, War Games.

HOME: Bartender, Nutrition, Conversion, Perpetual Calendar, Base Conversion, Calculator, Vacation Check-off List, Telecode, Message Board, Night Check-off List, Expense Account, Babysitter, Drunkometer, Remember, Christmas List, Mileage.

GAMES: Jumble, Search, Memory Quiz Letters, Sting Ray, Russian Roulette, Wheel of Fortune, Towers, Decision, Memory Quiz Numbers, Doomsday, Star Trek,™ Sketch, Flipper, Life, Fifteen, Speedy, Count, Road Race, Stars, Odd One, Spy Ship, Horse Race, Scissors, Craps, Star Blazer, Tiger Shark, Unjumble, Mind Reader, Roach Race, Jumble 2, Gypsy.

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essary in your application. The first four questions are useful only if a printout in Level II is being used. Any of the questions may be deleted from the program by modifying lines 440-490 and lines 1070-1080.

After each question has been answered, the program allows the user to change any answers that may have been incorrectly entered. See Fig. 3. When all questions have been answered, the screen will display each question and answer. See Fig. 4.

The computer is now ready to

display the data. The flow of data can be stopped and continued at any time by using the BASIC commands BREAK and CONTINUE. See Fig. 5. When all the data has been displayed, an option is offered the user to either rerun the data or enter a new set of meter dial instructions. See Fig. 6.

Table 1 is a list of all variables used.

Lines 10-105 identify the program function. Values are assigned to the variables (questions) in lines 110-400. All ques-

tions and answers are displayed in lines 410-560. Lines 570-640 instruct the user in how to stop or continue the flow of data. A FOR-NEXT loop for the flow of data is set up in lines 650-780.

The necessary equations are included.

Lines 790-860 print the alarm points and their associated values. Lines 870-950 offer the user a choice to rerun the data

1. CUSTOMER NAME (16 CHARACTERS MAXIMUM)? J. DOE

CHECK YOUR ENTRY. ENTER # 20 IF CORRECT. ENTER THE NUMBER SHOWN ABOVE TO CHANGE THE INFORMATION. ?

Fig. 3

Program Listing 1

```

10 CLS
20 PRINT@335,"THIS PROGRAM PROVIDES THE DATA FOR
30 PRINT@399,"METER DIAL MARKINGS OF LINEAR
40 PRINT@463,"SYSTEMS.
50 FORX=22TO100:Y=13:SET(X,Y):SET(X,Y+13):NEXTX
60 X=22:FORY=13TO26:SET(X,Y):SET(X+78,Y):NEXTY
70 PRINT@768,"TRANSAMERICA - DELAVAL INC.
80 PRINT@832,"GEMS SENSORS DIVISION
90 PRINT@896,"FARMINGTON, CONNECTICUT
100 FORN=1TO3000:NEXTN
105 CLS
110 INPUT"1.CUSTOMER NAME (16 CHARACTERS MAXIMUM).";A$
115 O=1:GOSUB1000
120 INPUT"2.JOB NUMBER (NO LETTERS)";I
125 O=2:GOSUB1000
130 INPUT"3.DIAL IDENTIFICATION (16 CHARACTERS MAXIMUM)";B$
135 O=3:GOSUB1000
140 INPUT"4.DATE (EX. 1.479=JAN 4,1979. USE PERIOD).";J
145 O=4:GOSUB1000
150 INPUT"5.HIGHEST LEVEL INDICATED (GAL/LIT).";A
155 O=5:GOSUB1000
160 INPUT"6.LOWEST LEVEL INDICATED (GAL/LIT).";B
165 O=6:GOSUB1000
170 INPUT"7.HIGHEST LEVEL INDICATED (INCH/MET).";C
175 O=7:GOSUB1000
180 INPUT"8.LOWEST LEVEL INDICATED (INCH/MET).";D
185 O=8:GOSUB1000
190 INPUT"9.INCREMENT REQUIRED (GAL/LIT).";E
195 O=9:GOSUB1000
200 INPUT"10.FULL SCALE DEFLECTION OF METER IN MICROAMP S.";F
205 O=10:GOSUB1000
210 INPUT"11.FULL SCALE DEFLECTION OF METER IN DEGREES.";G
215 O=11:GOSUB1000
220 INPUT"12.NUMBER OF ALARM POINTS (MAXIMUM OF 4).";K
230 IFK=0THEN390
240 IF(K<0)+(K>4)THEN380
250 O=12:GOSUB1000
260 INPUT"13.FIRST ALARM POINT (GAL/LIT).";P
270 O=13:GOSUB1000
280 IFK=1THEN410
290 INPUT"14.SECOND ALARM POINT (GAL/LIT).";Q
300 O=14:GOSUB1000
310 IFK=2THEN410
320 INPUT"15.THIRD ALARM POINT (GAL/LIT).";R
330 O=15:GOSUB1000
340 IFK=3THEN410
350 INPUT"16.FOURTH ALARM POINT (GAL/LIT).";S
360 O=16:GOSUB1000
370 GOTO410
380 CLS:PRINT"INCORRECT ENTRY !":FORN=1TO1000:NEXTN:CLS
:GOTO220
390 PRINT"NO ALARM POINTS."
395 O=12:GOSUB1000
400 FORN=1TO1000:NEXTN
410 CLS
420 PRINT"YOUR DATA WAS ENTERED AS FOLLOWS : "
430 PRINT
440 PRINT"1.CUSTOMER:";A$;TAB(31),"7.MAX HEIGHT:";C;"IN
CH/METER"
450 PRINT"2.JOB # :";I;TAB(31),"8.MIN HEIGHT :";D;"INCH
/METER"
460 PRINT"3.DIAL # :";B$;TAB(31),"9.INCREMENT:";E;"GAL/
LIT"
470 PRINT"4.DATE:";J;TAB(31),"10.SCALE:";F;"MICROAMPS"
480 PRINT"5.MAX LEVEL:";A;"GAL/LIT";TAB(31),"11.SCALE:"
;G;"DEGREES
490 PRINT"6.MIN LEVEL:";B;"GAL/LIT"
500 IFK=0THEN560
510 PRINT
520 PRINT"12.1ST ALARM:";P;"GAL/LIT":IFK=1THEN570
530 PRINT"13.2CD ALARM:";Q;"GAL/LIT":IFK=2THEN570
540 PRINT"14.3RD ALARM:";R;"GAL/LIT":IFK=3THEN570
550 PRINT"15.4TH ALARM:";S;"GAL/LIT":GOTO570
560 PRINT"NO ALARMS"
570 PRINT
580 INPUT"ENTER ANY NUMBER TO CONTINUE.";M
590 CLS:PRINT"THE DATA WILL NOW BE DISPLAYED ON THE SCR
EEN.
600 PRINT"DEPRESS THE 'BREAK' KEY TO STOP THE FLOW OF D
ATA.
610 PRINT"ENTER 'C.' TO CONTINUE THE DATA (INCLUDE THE
PERIOD).
620 PRINT
630 INPUT"ENTER ANY NUMBER TO DISPLAY THE DATA.";M
640 CLS
650 H=INT(A/E):Z=INT(B/E)*E
660 PRINT"GAL/LIT","INCH/MET","MICROAMPS","DEGREES"
670 PRINTB,D,"0","0"
680 FORN=1TOH
690 Z=Z+E
700 Y=(Z-B)*F/(A-B)
710 X=(Z-B)*((C-D)/(A-B))+D
720 W=Y*G/F
730 IFZ>=ATHEN760
740 PRINTZ,X,Y,W
750 NEXTN
760 PRINTA,C,F,G
770 PRINT"GAL/LIT","INCH/MET","MICROAMPS","DEGREES"
780 PRINT
790 PRINT"ALARM POINT","GAL/LIT","MICROAMPS","DEGREES"
800 IFK=0THEN860
810 PRINT
820 Y=(P-B)*F/(A-B):W=Y*G/F:PRINT"FIRST",P,Y,W:IFK=1GOT
O890
830 Y=(Q-B)*F/(A-B):W=Y*G/F:PRINT"SECOND",Q,Y,W:IFK=2GO
TO890
840 Y=(R-B)*F/(A-B):W=Y*G/F:PRINT"THIRD",R,Y,W:IFK=3GOT
O890
850 Y=(S-B)*F/(A-B):W=Y*G/F:PRINT"FOURTH",S,Y,W:GOTO890
860 PRINT"NONE"
880 PRINT
890 PRINT"1.RERUN DATA.:PRINT"2.NEW DIAL."
900 PRINT
910 INPUT"ENTER THE NUMBER SHOWN FOR YOUR SELECTION.";N
920 IF(N<=0)+(N>2)THEN940
930 ON N GOTO640,105
940 CLS:PRINT"INCORRECT ENTRY !":FORN=1TO1000:NEXTN:CLS
:GOTO890
950 END
1000 PRINT@704,"CHECK YOUR ENTRY. ENTER # 20 IF CORRECT
. ENTER
1010 PRINT@768,"THE NUMBER SHOWN ABOVE TO CHANGE THE IN
FORMATION.
1020 INPUTL
1030 IFL=OGOTO1060
1040 IFL=20GOTO1070
1050 CLS:PRINT"INCORRECT ENTRY !":FORN=1TO1000:NEXTN:CL
S
1055 L=O
1060 CLS
1070 ONLGOTO110,120,130,140,150,160,170,180,190,200,210
1080 ONL-11GOTO220,260,290,320,350
1090 CLS:RETURN
9999 END

```

or to enter new dial information. Subroutine 1000 checks all answers and allows the user to change any incorrect entries.

The program can be greatly reduced if a printout or alarm

points are not required. The only lines used in this instance would be lines 150 through 215, and, of course, the remainder of the program would have to be modified accordingly. ■

YOUR DATA WAS ENTERED AS FOLLOWS

- | | |
|-----------------------------|-----------------------------|
| 1. CUSTOMER:J.DOE | 7. MAX HEIGHT:98 INCH/METER |
| 2. JOB#:12345 | 8. MIN HEIGHT:8 INCH/METER |
| 3. DIAL#:TANK# | 9. INCREMENT:1000 GAL/LIT |
| 4. DATE:9.27.79 | 10. SCALE:200 MICROAMPS |
| 5. MAX LEVEL:24500 GAL/LIT | 11. SCALE:250 DEGREES |
| 6. MIN LEVEL:1500 GAL/LIT | |
| 12. 1ST ALARM:4800 GAL/LIT | |
| 13. 2ND ALARM:9700 GAL/LIT | |
| 14. 3RD ALARM:1495 GAL/LIT | |
| 15. 4TH ALARM:19800 GAL/LIT | |

ENTER ANY NUMBER TO CONTINUE.?

Fig. 4

22000	88.2174	178.261	222.826
23000	92.1304	186.956	233.696
24000	96.0435	195.652	244.565
24500	98	200	250
GAL/LIT	INCH/MET	MICROAMPS	DEGREES
ALARM POINT	GAL/LIT	MICROAMPS	DEGREES
FIRST	4800	28.6956	35.8696
SECOND	9700	71.3043	89.1304
THIRD	14500	113.043	141.304
FOURTH	19800	159.13	198.913

1. RERUN DATA
2. NEW DIAL

ENTER THE NUMBER SHOWN FOR YOUR SELECTION?

Fig. 5

GAL/LIT	INCH/MET	MICROAMPS	DEGREES
1500	8	0	0
2000	9.95625	4.34783	5.43478
3000	13.8696	13.0435	16.3043
4000	17.7826	21.7391	27.1739
5000	21.6956	30.4348	38.0435
6000	25.6087	39.1304	48.913
7000	29.5217	47.8261	59.7826
8000	33.4348	56.5217	70.6522
9000	37.3478	65.2174	81.5217
10000	41.2609	73.913	92.3913
11000	45.1739	82.6087	103.261
12000	49.0869	91.3043	114.13

BREAK AT 720

>_

C.

Fig. 6

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System
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and such lively phrases as:

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"the generation of"
"for the accomplishment of"

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Persannel Director—

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If you're involved in one of the many home distributorships or vending is your business this article will show you how to use your Radio Shack TRS-80 to save time and money! Although these four Level II 16K programs are specifically designed for Amway product distributors, (home and personal care products), they can be modified for most other BASIC microcom-

puters and used in many other small business applications. Neither printer nor disk is required.

Four programs are useful to the larger Amway product distributor. Program Listing 1 is Order Verification. Over 300 products are listed in the distributor price list, and each has various numbers associated with it, such as stock number, quantity per case, discount percentage and prices.

Once found, the prices (called PV, BV, cost and suggested retail, for each item) must be multiplied by the quantity ordered and the results entered in four columns of the order form.

A typical full-page order that would take 15 or 20 minutes to check manually takes two or three minutes using this program and yields more accuracy, since non-taxables are not overlooked.

Totals, tax and handling appear on command, and non-taxable items are automatically deducted.

Program Listing 2 is a Distributor Organization and is most handy if you have a printer available. It uses a menu and either screen or printer output. This is

like a super card file program, where all distributors or outlets are listed and are selected, alphabetically, by selected groups.

Program Listing 3, Bookkeeper, adds all twelve columns of a ledger and accumulates page totals for monthly or annual grand totals.

Program Listing 4 calculates and displays for screen and/or printer the Monthly Gross Profit Summary.

All of these programs can be modified for more general use, and are available on cassette or Stringy Floppy wafer for the TRS-80.

Order Verification Program

This program uses virtually all of the TRS-80 16K memory, since it is filled with DATA statements and uses a lot of array space. The listing just shows a few of the statements, so that you can see the format. Each DATA statement contains: quantity per case, stock number, PV, BV, cost, and suggested retail. Decimal points are omitted from the prices.

Let's RUN the sample order (Fig. 1), so you'll see how this works. CLOAD the Order Verification program, type RUN and

Instead of:	Use:
Blusher Stick.....	BLUSHER
Blush, Powder.....	BLUSH
Cover Up.....	COVER
Eyebrow Pencil.....	PENCIL
Eyeshadow.....	SHADOW
Eyeliner.....	LINER
Face Powder.....	FACE
Lip Glosser.....	LIPS
Lipstick.....	LIPS
Natural Lipstick.....	NAT LIPS
Foundation.....	FOUNDATION
Mascara.....	MASCARA
Pressed Powder.....	PRESSED
Men's Socks.....	SOX
Knee-Hi Hosiery.....	KNEE
One-Size Stretch Hosiery.....	STRETCH
Control Top Hosiery.....	CONTROL
Panty Hosiery.....	PANTY
Soft-Sheer Hosiery.....	SOFT
Support Hosiery.....	SUPPORT
EAD-9540 Sales Kit.....	KIT
Literature Kit Only.....	LIT KIT
Distributor Order Form.....	PAD
SA-13 Price List.....	SA13

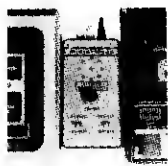
Table 1. Generic Product Names

CASSETTE CONTROL UNIT

• Speed up your cassette tape handling • Pinpoint program locations on tape with an audio monitor • Get protection from recording and playback glitches resulting from ground loops • Eliminate the tedious plugging and unplugging of recorder cables

The Micro-Mega Cassette Control Unit does all this and more. You get instant manual control of the recorder at the flick of a switch. Want to find the beginning or end of a program? Flick another switch and you'll hear it. All cables remain plugged in all the time.

The Micro-Mega Cassette Control Unit does a lot to improve the appearance of your TRS-80 system, too. As shown, it's in a 2 1/2" x 5" box which snugly fits between the keyboard and your recorder. There is no need to move the recorder, and all cables come neatly into the unit. The Cassette Control Unit is tailored to the CTR-41 recorder, but may be used with most other recorders as well.



CASSETTE CONTROL UNIT.....\$37.95
Add \$1.00 for postage and handling

CPU MONITOR

Ever find yourself with a blank screen wondering what your computer is up to? The Micro-Mega Monitor can tell you, for example: • If your CPU is in a loop with no exit, • When a long sort is nearing completion, or • If a key bounce during keyboard input. The CPU Monitor lets you listen to all CSAVEs and CLOADs and will help you quickly find the correct recorder volume setting. If you have an expansion interface, you will always know whether the real-time clock is on or off because you can hear it.

The Micro-Mega CPU Monitor gives a voice to the Z-80 microprocessor in your TRS-80 by using AM radio circuitry to pick up the computational rhythms of the CPU, which are amplified and played through a loudspeaker. The pickup unit of the CPU Monitor, shown at left in the photo, goes under your TRS-80 keyboard. It is connected by a 36" cable to the speaker and control unit, which includes an on/off volume control and an LED "power-on" indicator. The Monitor is powered by an AC adapter, shown at right in the photo. No batteries are needed and no electrical connections to your TRS-80 are required.



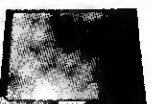
By listening to the CPU Monitor, you will soon become familiar with the "personalities" of the programs you run and whether they are executing in a normal way. (See "Gaming Environment" below.)

CPU MONITOR.....\$47.95
Add \$2.00 for postage and handling

THE ORIGINAL GREEN-SCREEN

The eye-glazing Green-Screen fits over the CRT of your TRS-80 Video Display and gives you improved contrast with reduced glare. You get bright, luminous green characters and graphics like those featured by very expensive CRT units.

The Green-Screen is closely matched to the color and texture of the TRS-80 Video Display and improves the overall appearance of your system. It is attached with adhesive strips, which do not mar your display unit in any way. The Micro-Mega Green-Screen gives improved video display visibility for all applications and is especially effective in creating dramatic, high-impact displays for computer games. (See "Gaming Environment" below.)



THE GREEN-SCREEN.....\$13.95
Add \$1.00 for postage and handling

THE ULTIMATE STAR TREK PACKAGE

Tired of trivial computer games? This complete Star Trek package will provide you with endless fascination and challenge. In addition to the program cassette, it includes comprehensive instructions, a pad of "Voyage Log" record sheets, and a free-standing "Torpedo and Maneuvering Chart."

The package is built around the latest version of Lance Mackless' incomparable Star Trek III, a 13,000 byte program with a host of subtle and imaginative features, which include numerous dynamic and spectacular graphic displays. Star Trek III puts you in command of the Enterprise cruising in a galaxy of 192 quadrants filled with uncharted hazards, including hostile Klingons, pulsars, and black holes. You have at your disposal scanners, various weapons and defense systems, on-board computers, and a loyal crew. (You will need them all to survive the Klingons.)

Your mission is to lead the region of Klingons and to locate the inhabitable planets, all within 300 star-days, before returning to Star Fleet Headquarters where your overall effectiveness as a starship commander will be scored. High scores are possible only with careful planning and effective battle tactics. The "Voyage Log" sheets will guide your strategy, and the "Torpedo and Maneuvering Chart" will give you a vital edge in combat. (When you engage three Klingon ships you can't afford to miss.)



STAR TREK PACKAGE (for Level II, 16K only).....\$22.95
Add \$1.00 for postage and handling

CREATE YOUR OWN SPECTACULAR GAMING ENVIRONMENT (and save \$5.00)

The Enterprise is in battle trim with deflector shields at full power. As her captain, you are taking her into combat. The battle-stations siren rings in your ears and "CONDITION RED" flashes on your monitor screen. You call for warp drive and key in the coordinates of the quadrant where your scanners have detected Klingon ships. As you select the warp factor, you hear the reassuring clinking of your navigational gear as it activates the warp drive.

Suddenly, you break out of hyperspace and your monitor displays the chilling sight of three Klingon Battle Cruisers floating on your screen! Their evil shapes glow in luminous green against the black void of space. Moments later, you hear the characteristic rasping sound of Klingon laser weapons, and, as you watch, high-energy beams come knitting toward the Enterprise in succession from each of the Klingon ships.

You have been hit! You hear the distant sound of the damage control alarm as "DAMAGE TO WARP DRIVE" and "DAMAGE TO PHASERS" flash on your screen. The Klingons have stopped firing! The Enterprise is crippled, but your bow weapon is still intact, and it's your turn now! You key in the command to fire torpedoes. As your screen again displays the position of the Klingon ships, you select a firing vector from your torpedo chart and key it in. Now you hear the buzz of your photon torpedoes as you see if spearing toward a Klingon ship it strikes him dead-center! As three watch, the Klingon Battle Cruiser disintegrates, accompanied by a satisfying crashing sound.

Does the above scenario sound far-fetched? Not at all. It's a small sample of what you will experience with Micro-Mega's Gaming Environment, which consists of: • The STAR TREK PACKAGE • THE GREEN-SCREEN and • THE CPU MONITOR. The fast-paced and dynamic action reflects the superb Star Trek III program together with the "Voyage Log" and "Torpedo Chart" of the Star Trek Package. All of the unique graphic displays are greatly enhanced by the Green-Screen. Finally, the uncanny sound effects are produced by the CPU Monitor, which intelligently picks up the FOR, NEXT loops and other CPU patterns, which create the distinctive siren sounds that accompany the ALERT and DAMAGE messages along with the harsher notes of the weapons salvos. Once you've tried it, you won't any longer be satisfied with silent computer games.

Remember that with the Gaming Environment you also get all the other excellent features of the CPU Monitor and the Green Screen for non-gaming applications. You save \$5.00 off the combined cost of the individual items.

GAMING ENVIRONMENT.....\$79.85
Add \$3.50 for postage and handling

Terms: Check or money order, no CODs or credit cards, please. Add amount shown for postage and handling to price of the item. All items shipped within 48 hours by first class or priority mail. Virginia residents, add 4% sales tax.

✓ 29

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ENTER. The display screen clears and asks for your patience while it loads DATA. A string-array is being loaded with stock numbers (or generic names), while a numeric array is loaded with all the other DATA items. This takes about 13 seconds.

The screen clears and a message at the top asks you if this is an Amway Regional Distribution Center (RDC) order (no handling charge). Type N and ENTER. (If you type Y, the handling charge added later will be zero.)

The screen clears, column headings appear and, in about two seconds, a screen prompt asks for your entry.

Look at Fig. 1 again. Line 1 shows a 3 in the each column and a stock number of E-8023. Type in 3,E,8023 and ENTER. Don't forget the commas! The "E" stands for "each". For "cases", you would use a C instead of E. The stock number is always preceded by an A- or E-, which must not be entered.

The computer searches the string array for a match with the stock number (8023 in this example). When it locates this exact match, the quantity per case, PV, BV, cost and suggested retail are pulled from the adjacent numeric array locations, processed by the program and the results printed under the column headings.

This takes several seconds for the first item after array loading, as the computer does some internal housekeeping. After that, the action is normal. The screen prompt instantly appears again. Type 2,E,4211 and ENTER.

Notice the next two items (lines 3 and 4) are case quantities. Type in 1,C,8220. When the results appear on the screen, an N appears after the last number. This indicates this item is non-taxable.

Next enter 2,C,8268 and then 5,E,47. For line 6 use the generic word KIT (see Table 1): 1,E,KIT. Similarly, for the next line use 1,E,SA13.

Now, the next item, line 8, is a sales aid not in memory. The prefix is not an E- or A-, so the stock number is not 5. What to

do? Simple!

Type in 9,9,9 and ENTER. The program jumps to the hand-entry mode and prints an entry prompt at the bottom of the screen. The program also does this if it can't find a match for your typed stock number in the normal-entry mode. Type 4,BOT-TLE,0,0,32,32 and ENTER. The computer will multiply the last four numeric entries (include the decimal point!) by the first number and display the results in the proper columns.

You could type anything (up to 9 characters) in place of BOT-TLE; whatever you type appears in the stock number column. In the hand-entry mode, the quantity is always EACH.

Similarly, type 9,9,9 and ENTER, then 1,TAPE,0,0,1.75, 1.75 and ENTER for line 9. The last item is lipstick. Enter this as 2,E,LIPS.

For totals, type 0,0,0 and ENTER. A line is drawn below the last numbers, the four right columns are totaled, and tax and handling are added for a grand total.

The N after the last column total means the sales tax of the item with an N in that column has been subtracted.

The sales tax is calculated by line 820 and displayed by line 855. The variable H is retail value. For a different percentage, change lines 820 and 855.

The handling in this example is two percent of the retail value, variable H. This is calculated by line 835 and displayed by line 860. Change this if it's necessary. If handling is to be based on cost, variable G should be used instead of H. For example, for three percent of cost, line 835 should be $S = .03 * G$ and the two percent displayed by line 860 should be changed to three percent.

At this point, it's only necessary to compare the computer totals with the order being verified. If they are the same, the order is correct.

A screen prompt asks if you wish to make changes. If you ENTER a Y, the normal screen prompt appears. To subtract a wrong entry, use a negative sign in front of the quantity. 0,0,0 gives new totals.

Suppose some of the numbers you wish to verify have scrolled off the top of the screen? Don't worry. Just bypass the CHANGES? prompt with N and the computer will ask you if you wish a review. Type Y and ENTER. The screen clears, and the last four column numbers march down the screen starting with line 1.

You can keep these numbers from going off the top of the screen by holding down the SHIFT key and pressing the ' key to stop and start the scrolling.

If you type N to the review request, the computer will ask if you wish to check another order. If you type Y you'll be at the start of another order instantly with none of the start-up delays experienced on your first order.

All this sounds terribly complicated, but it's really a breeze, and you'll learn very quickly. There are some limitations and hints that will help you. For example, the arrays will only allow 27 lines maximum for the entries, including hand entries. You can enter 1,ERROR,0,0,0 to the lower screen prompt to

return to the normal entry prompt without effecting column totals.

Non-taxable stock numbers can be added or removed in lines 450 and 630.

If the program bombs out because of improper entries (forgotten commas, letters where there should be numbers, hitting the CLEAR or BREAK key by mistake, etc.) you can usually recover by typing GOTO 270 to continue the order, or GOTO 200 to start another order.

If you wish to exit the program at any time, such as to perform a calculation, press BREAK and re-enter with CONT to continue from where you were. (This will not work if you LIST after BREAK. Use GOTO 270.)

If all else fails, RUN always gets you back into the program with the 13 second wait for DATA loading, and the slight delay for first entry processing.

Distributor Records Program

CLOAD and RUN the Distributor Records program. An introduction appears on the screen. Press ENTER and instructions appear on the screen, telling you

DISTRIBUTOR ORDER FORM

No. 032092

USE THIS FORM FOR ALL ITEMS

LINE NO.	QTY	QTY	STOCK NO.	DESCRIPTION	SIZE	POINT VALUE	BUSINESS VOLUME	DISTRIBUTOR COST	RETAIL (FOR SALES TAX)
1	3		E-8023	SA8+	54	1380	1780	1770	22.65
2	2		A-4211	BIO-C PLUS		32.00	38.00	27.86	41.00
3	1		E-8220	FOOD BAR (ALMOND)		39.30	50.40	36.36	54.00
4	2		E-8268	SA8+	12#	53.10	77.40	66.18	85.50
5	5		E-47	SHOE SPRAY		13.75	20.00	15.50	22.50
6	1		ED9540	SALES & PRODUCT KIT		27.40	40.18	34.90	54.90
7	1		SA-13	PRICE LIST		-	-	34	34
8	4		EA-5	SQUEEZE BOTTLE @ 32#		-	-	128	128
9	1		VA-2129	TAPE - NUTRILITE		-	-	175	175
10	2		A-1605	GERMANIUM LIPSTICK		4.80	6.70	5.26	7.60
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									

* = NOT-TAXABLE ITEM

ABOVE ITEMS RECEIVED AS MARKED:

(PLEASE SIGN)

CHECK NUMBER	CHECK AMT.	RECEIVED	CASH AMT.	MONTHLY TALLY	PV	BV	TOTALS	SALES TAX ON RETAIL TOTAL	HANDLING	TOTAL REMITTANCE WHICH MUST ACCOMPANY THIS ORDER
							186.15	252.83	226.83	271.52
								14.25		
								5.83		
								246.71		

NAME JIM SMITH SPONSOR TOM JONES TODAY'S DATE 9/15/79

Fig. 1. Sample Order



- IMPROVE IMAGE CONTRAST
- REDUCE EYE FATIGUE
- ENHANCE SCREEN LEGIBILITY
- PROVIDE A MORE PLEASING DISPLAY
- GIVE A DISTINCTIVE PROFESSIONAL LOOK TO YOUR SYSTEM

The GREEN SCREEN is custom molded to fit nicely over the picture tube. It ingeniously mounts in seconds without any tools.

CALL: (212) 296-5916

or send \$12.50 + \$2 S&H



ALPHA product co.

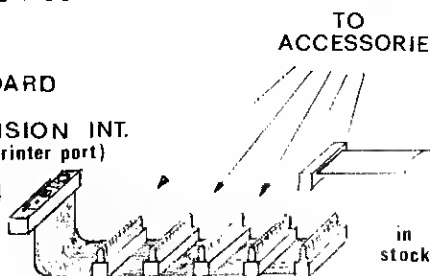
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KEYBOARD
OR
EXPANSION INT.
(screen printer port)

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+\$2s&h



ALL GOLD PLATED CONTACTS

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16 channel I/O module, 8 inputs, 8 outputs, 2 relays, 2 opto-isolated inputs Very easy to use with BASIC. Extensive user's manual included. Sold worldwide for over a year.

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TAKE NOTE.

The Music Box IS HERE!



Newtech Computer Systems, a leading manufacturer of music peripherals and software for S-100 and SS-50 computers, introduces the MUSIC BOX.

The MUSIC BOX is a complete hardware/software tool that enables you to produce music and sound effects on your TRS-80.

You can compose music, play or sing along with the computer, or just listen to your favorite tunes—up to four notes at a time, with a seven-octave range. And you can make it sound like one, two, three, or four different musical instruments at the same time. Or you can make all sorts of weird sound effects and noises like explosions, gun shots, "phasers" and other space war sounds—not to mention bells and whistles.

The MUSIC BOX plugs into the TRS-80 keyboard or the Expansion Interface Plus Extension. It includes a volume control, a 400 milliwatt power amp, and phone jack for easy connection to an external speaker. Software is supplied on Level II cassette. Requires a 32K RAM or larger Level II computer.

Future software developments include more pre-coded music, games with sound effects, music education, telephonic tone dialing, and Morse code programs.

\$249.

Complete with software and manual.
TRS-80 and TRS-800 Series. (450) 211-1111 for shipping, (450) 211-1100 for
track orders. (450) 211-1111 for C.O.D.

NEWTECH

COMPUTER SYSTEMS, INC.

230 Clinton Street, Brooklyn, New York 11201 • (212) 625-6221

MONTHLY GROSS PROFIT STATEMENT

NAME: SMITH STATE: CA ADA #: 6579 MONTH: SEPT 1979
UPLINE DIRECT: JONES HIS NUMBER: 952

DISTRIBUTOR'S NAME	BONUS %	BV	BONUS
DIXON	15	1835.17	275.28
ALLEN	9	726.3	65.37
DAVIS	3	126.15	3.78
JOHNSON	12	1215.37	145.84
BECKER	3	180.25	5.41
SANDER	6	351.3	21.08
HESS	0	75.17	0
NO BONUSES	0	425.8	0
STEVENS	18	3008.15	541.47

TOTALS: 7943.66 1058.23

LINE 3: PERSONAL RETAIL SALES	217.6
LINE 4: TOTAL BV PURCHASES	7943.66
LINE 5: TOTAL BV SOLD	8161.26
LINE 6: BONUS BRACKET	25 %
LINE 7: PERFORMANCE BONUS	2040.32
LINE 8: BONUSES PAID OUT	1058.23
LINE 9: BONUS GROSS PROFIT	982.09
LINE 10: RETAIL PROFIT	65.28
LINE 10A: SERVICING FEES	78.35
LINE 11: 3% DD BONUS	628.2
LINE 12: ... TOTAL GROSS INCOME	1753.92

Fig. 2. Monthly Profit Statement

how to enter your own DATA statements. The listing shows only names A-C and W-Z to illustrate the format. The larger the organization, the more value this program has.

Press ENTER. The screen asks you to enter 1 for printer, 0 for screen. Type 0 and ENTER, and a menu of six choices appears on your screen.

Type 1 and ENTER. The screen asks for the distributor's last name. Type ANDERSON and ENTER. The screen shows the "sponsor" (BURLEW), one Amway classification, and "group" (SCOTT). The group refers to the name of the head of that leg of the organization. A prompt asks for a 1 if you want to go again, or a 0 if you don't.

Bookkeeper

This program assumes you are using 12-column ledger for your bookkeeping. CLOAD and RUN. The instructions are simple.

When ready, press ENTER. The program assumes column 1 in your ledger is the dollar amount of the item. Type and ENTER this figure. A prompt then asks you what column this should go under. Type in the column number (2-12) and another AMOUNT? prompt appears.

Keep answering the prompts until you are at the end of the ledger page entries. At that point, enter 0 for AMOUNT? and the computer displays column

number headings, totals for each column and the grand total (column 1) set aside by a simple graphic bracket.

If you have additional entries, type and ENTER 1. These are then added (or subtracted, if you use the minus sign) from the previous total.

When you have completed the entries for this page, the computer will ask if you want cumulated totals—that is, the total of previous pages plus this page. Respond with a 1 for yes and the cumulated totals are displayed. Of course, on the first page, these are simply the page totals repeated. To do another page, enter 1 to the AGAIN? prompt.

Monthly Profit Statement

In order for distributors to qualify for profit sharing, various recognition levels and several highly-lucrative bonuses, a Monthly Gross Profit Statement must be submitted to Amway. This summary requires various calculations and is a natural for computerization. This program uses prompts to enter raw data and does all calculations.

A sample printer run is shown in Fig. 2. The screen display, which can be entered manually on the statement, looks the same.

These programs are specifically designed for Amway product distributors, except for Program Listing 3. Obviously, that

PROFESSIONAL

**HALF A MILLION TAX RETURNS CAN'T BE WRONG!
(OR THEY HAD BETTER NOT BE)**



INCOME TAX SYSTEM FOR TRS-80* MODEL I OR II

Our system, which prepared 500,000 1979 returns, features the following:

1. Full interactive user control, in **tax-form language only**, line-by-line.
2. Screen display of full 1040 and all schedules, prior to printout.
3. Change of a single amount item automatically changes and re-computes entire return.
4. All printout formats IRS and state approved.
5. Stores Preparer's Identification for automatic printing at bottom of page 2.
6. Built-in Validation Check tests entire system, hardware and software.
7. Special Printer Adjustment routines, Line Length, etc.
8. Selection of closed or open output formats—for standard Form 1040 or open name-box types.
9. **Software control of text position on page.** Makes forms-alignment simple. Permits use with non-adjustable printers.
10. Fills in pre-printed Forms or you can use overlays. Your choice.
11. Automatically computes: Tax - SDI Overpayment - Wages Total from W-2's - Earned Income Credit - Income Averaging - Maximum/Minimum Tax - Least Tax Method - All Percentage of Income Limitations - All Fixed Limitations - many, many more.
12. Full support through the tax season — no charge.
13. Inexpensive yearly updates in accordance with tax-law changes.
14. Modular construction — lets you order only the type and size system you need.

PRICING STARTS AT \$189.95 (1040 & SCHEDULE A)

25-PAGE DESCRIPTIVE MANUAL \$7.50 (Refunded on Order)

MINIMUM SYSTEM REQUIRED: MODEL I, 32K, 1 DISK DRIVE

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★ ★ ★ 20 YEARS OF SERVICE ★ ★ ★

4 SPEED OPTIONS FOR YOUR TRS-80!

The SK-2 is the most versatile clock modification available for the TRS-80. Speeds may be switched between normal, a reliable increase of 50%, or a 50% reduction, selectable at any time without interrupting execution or crashing the program. Instructions are also given for a 100% increase in 3.54 MHz (your TRS-80 may not be reliable at this speed). It may be configured by the user to change speed with a toggle switch or on software command. It will automatically return to normal speed any time a disk is active, requires no change to the operating system, and has provisions for adding an LED to indicate when the computer is not at normal speed. It mounts inside the keyboard unit with only 4 necessary connections for the switch option (switch not included), and is easily removed if the computer ever needs service. The SK-2 comes fully assembled with socketed IC's and illustrated instructions. Complete satisfaction is guaranteed. SK-2.....\$24.95

PROGRAM INDEX FOR OISK BASIC

Assemble an alphabetized index of your entire program library from disk directories. Program names and free space are read automatically (need not be typed in) and may be alphabetized by disk or program. The list may also be searched for any disk, program, or extension; disks or programs added or deleted; and the whole list or any part sent to the printer. Finally, the list itself may be stored to disk for future access and update. Reviewed in the January issue of 80 Microcomputing. One drive and 32K required. INDEX.....\$19.95

DUPLICATE SYSTEM TAPES WITH "CLONE"

This machine language program makes duplicate copies of ANY tape written for Level II. They may be SYSTEM tapes (continuous or not) or data lists. It is not necessary to know the file name or where it loads in memory, and there is no chance of system co-residency. The file name, entry point, and every byte (in ASCII format) are displayed on the video screen. Data may be modified before copy is produced. CLONE.....\$16.95

EDIT BASIC PROGRAMS WITH ELECTRIC PENCIL

This program allows disk users to load basic programs or any other ASCII data file into the disk version of Electric Pencil for editing. Edit line numbers, move or duplicate program segments, and search for the occurrence of any group of characters. One command from DOS quickly modifies existing files to Pencil format. PENPATCH.....\$9.95

SPOOLER FOR PARALLEL PRINTERS

This program is a full feature print formatting package featuring user definable line and page length (with line feeds inserted between words or after punctuation), screen dump, keyboard debounce, and printer pause control. In addition, printing is done from a 4K expandable buffer area so that the LPRINT or LLIST command returns control to the user while printing is being done. Ideal for Selectric or other slow printers. Allows printing and processing to run concurrently. SPOOLER.....\$16.95

RAM TEST FOR LEVEL II

This machine language program tests memory chips for open or shorted address or data lines as well as intermittents. It tests each BIT for validity and each BYTE in the execution of an actual instruction as in real program execution. Bad addresses are displayed along with the bad data and proper data. One complete test of 48K takes just 14 seconds. Also includes a test for errors induced by power line glitches from external equipment. RAMTEST.....\$9.95

INSIDE LEVEL II

Inside Level II is a comprehensive reference guide to the Level II ROMs which allows the machine language programmer to easily utilize the sophisticated routines they contain. Concisely explains set-ups, calling sequences, variable passage, and DO routines. Special consideration is given to disk systems. Part II presents an entirely new composite program structure which loads under the SYSTEM command and executes in both Basic and machine code with the speed and efficiency of a compiler. In addition, the 18 chapters include a large body of other information useful to the programmer. INSIDE LEVEL II.....\$15.95

Please include .75 postage. California residents add 6% sales tax.

All programs are usually shipped on cassette. Add \$4.00 for disk. Complete satisfaction or full refund

MUMFORD MICRO SYSTEMS

Box 435—E Summerland, California 93067 (805) 969-4557 ✓ 144

BXREF

BASIC Cross-Reference Listing Program

This program is a BASIC Cross-Reference Listing Program for the TRS-80® Model I with disk.

It reads a saved BASIC program from disk and will print it as an option. It can then print an alphabetized list of all variables used in the BASIC program, listing all statement numbers where each variable is used. After the variables, a similar list of all referenced statement numbers follows, i.e. all statement numbers used in a GOTO, GOSUB or RESUME. Statement numbers which do not exist are flagged as undefined.

The program features output to printer, screen or disk file. It also features page number and heading (except to screen) with automatic file name, date and time in the page heading. It is written in Assembler so it is very fast and does not tie up memory with BASIC program. Paging is adjustable for almost any page width or length.

Requires Level II 16K

Disk Only \$29.95



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program can be used anywhere 12 columns need to be added.

But how about Program Listing 1? Well, it can be adapted to any business where invoices need to be checked using pricing data in memory. You may find less than four columns of pricing information is needed, thus simplifying the program.

Program Listing 2 is an in-memory filing system. The DATA statements can be structured with names of prospects, clients, customers or whatever. Code numbers can be used to segregate customers by whatever categories apply. You can use zip codes, cities or states as geographical separations. Of course, some BASIC programming knowledge is required to make any changes, but the framework is here.

Program Listing 4 illustrates how a form can be reduced to computer language and use. As you run this program you'll find several formatting techniques that could be applied to other programs—particularly the placement of the input statements on the screen.

While these programs are not

sophisticated, they do work. If you wish to bypass the painful and time-consuming experience of troubleshooting your own entry, the four programs, with the necessary documentation are available for \$25

Addendum

Since these programs were submitted to 80 Microcomputing, a number of significant improvements have been made in the Order Verification Program. The output can now be directed to both screen and printer, or to screen alone. Therefore, this program can now be used to generate orders as well as verify them! Also, the output is formatted with two aligned decimal places for each of the four columns.

Furthermore, since DATA statements are now entered in numerical and alphabetical order, an added search program yields almost immediate access to any item in memory.

The cassette/wafer and documentation in this article contain the latest hi-speed version of this program, with current USA prices. The other programs are unchanged.

Program Listing 1. Order Verification

```
100 REM LEVELII 16K AMWAY ORDER VERIFICATION - VERSION
    4/28/79
110 REM COPYRIGHT 1979 FRED BLECHMAN
120 DEFINT A,D,N,Q,X,Y,Z
130 DIMA(1450),AS(200),B(100),TS(100)
140 CLS:N=1:Y=1:PRINT@460,"...PATIENCE...LOADING DATA..
    "
150 READA(N),AS(Y),A(N+1),A(N+2),A(N+3),A(N+4)
160 IFA(N)=999GOTO 200
170 N=5*Y+1:Y=Y+1:GOTO 150
200 CLS:PRINT
210 INPUT"RDC ORDER (NO HANDLING) Y/N";RS
220 IF LEFT$(RS,1)="Y" OR LEFT$(RS,1)="N" GOTO 230 ELSE
    210
230 CLS:Z=1:Z1=1:PRINT
240 PRINTTAB(0)"QTY";TAB(5)"C/E";TAB(15)"#";TAB(25)"PV"
    ;
250 PRINTTAB(35)"BV";TAB(45)"COST";TAB(55)"RETAIL"
260 X=128:E=0:F=0:G=0:H=0:I=0:D=0
270 IFX>832THENX=832
280 IFX=832PRINT:PRINT
300 PRINT@X,"QTY",CASE(C) OR EACH(E),STOCK "#";
310 INPUTQ,AS,SS
320 IFQ=0THENX=960:GOTO 800
330 IFS$="9"GOTO 400
340 A=Q:N=1:Y=1
350 NS=AS(Y)
360 IFN$="END"GOTO 400
370 IFN$=SSGOTO 600
380 N=5*Y+1:Y=Y+1:GOTO 350
400 PRINT@896,"ENTER:QTY.,#,PV,BV,COST,RETAIL";
410 INPUTQ,SS,PV,BV,C,R
420 IFQ=0THENX=960:GOTO 800
430 PRINT@832,CHR$(30):AS$="E"
440 P1=PV*Q:B1=BV*Q:C1=C*Q:R1=R*Q
450 IFS$="8383"ORS$="8218"ORS$="8220"THEND=1
460 B(Z)=P1:B(Z+1)=B1:B(Z+2)=C1:B(Z+3)=R1
470 IFD=1THENT$(Z+3)="N"
480 Z=Z+4:Z1=Z1+4
490 PRINT@X,Q;TAB(5)AS;TAB(15)SS;TAB(25)P1;TAB(35)B1;TA
    B(45)C1;TAB(55)R1;
500 IFD=1PRINT"N"
```

```

510 PRINT:PRINT@896,CHR$(30)
520 X=X+64:E=E+P1:F=F+B1:G=G+C1:H=H+R1
530 IFD=1THENI=I+R1
540 D=0:GOTO 270
600 B=A(N):PV=A(N+1):BV=A(N+2):C=A(N+3):R=A(N+4)
610 IFA$="C"THENQ=Q*B
620 P1=PV*Q/100:B1=B*Q/100:C1=C*Q/100:R1=R*Q/100
630 IFN$="8383"ORN$="8218"ORN$="8220"THENND=1
640 B(Z)=P1:B(Z+1)=B1:B(Z+2)=C1:B(Z+3)=R1
650 IFD=1THENNT$(Z+3)="N"ELSET$(Z+3)=" "
660 Z=Z+4:Z1=Z1+4
670 PRINTX,A,TAB(5)A$;TAB(15)S$;TAB(25)P1;TAB(35)B1;TAB(45)C1;TAB(55)R1;
680 IFD=1PRINT"N"
690 PRINT:X=X+64:E=E+P1:F=F+B1:G=G+C1:H=H+R1
700 IFD=1THENI=I+R1
710 D=0:GOTO 270
800 PRINT"-----"
805 PRINT"TOTALS...";TAB(25)E;TAB(35)F;TAB(45)G;TAB(55)H;
810 IFI<>0PRINT"N":GOTO 820
815 PRINT
820 T=.06*H
825 IFI<>0THENT=T-(.06*I)
830 T=INT(T*100+.5)/100
835 S=.82*H
840 S=INT(S*100+.5)/100
845 IF LEFT$(R$,1)="Y" THEN S=0
850 M=G+T+S
855 PRINTTAB(28)"6% SALES TAX...";TAB(45)T
860 PRINTTAB(28)"2% HANDLING...";TAB(45)S
865 PRINTTAB(28)"GRAND TOTAL...";TAB(45)M
870 INPUT"CHANGES? Y/N";Y$
875 IF LEFT$(Y$,1)="Y" OR LEFT$(Y$,1)="N" GOTO 880 ELSE
GOTO 870
880 IF LEFT$(Y$,1)="Y" GOTO 278
885 PRINT:INPUT"REVIEW ORDER? Y/N";Z$
890 IF LEFT$(Z$,1)="Y" OR LEFT$(Z$,1)="N" GOTO 895 ELSE
GOTO 885
895 IF LEFT$(Z$,1)="Y" GOTO 925
900 PRINT:INPUT"ANOTHER ORDER? Y/N";X$
905 IF LEFT$(X$,1)="Y" OR LEFT$(X$,1)="N" GOTO 910 ELSE
GOTO 900
910 IF LEFT$(X$,1)="Y" GOTO 200
915 PRINT:PRINT"SEE YOU ANOTHER TIME. 'BYE....'"
920 END
925 CLS:PRINT:Z=1
930 PRINTTAB(25)B(Z);TAB(35)B(Z+1);TAB(45)B(Z+2);TAB(55)
B(Z+3);T$(Z+3)
935 Z=Z+4
940 IFZ=Z1GOTO 880
945 GOTO 930
1000 DATA12,744,388,425,332,488
1005 DATA12,8204,330,410,368,470
1010 DATA6,831,808,1805,874,1125
1015 DATA18,796,165,280,217,315
1020 DATA12,929,245,350,273,395
1025 DATA12,928,245,350,368,490
1030 DATA12,860,285,390,314,450
1035 DATA12,8371,250,315,255,365
2275 DATA1,PANTY,275,360,305,395
2280 DATA1,SOFT,210,255,227,290
2285 DATA1,SUPPORT,510,650,533,695
2290 DATA6,8347,360,515,400,588
2295 DATA6,8294,410,555,421,615
2300 DATA6,8348,440,625,477,695
2305 DATA6,8349,750,1075,839,1215
2310 DATA12,848,280,440,341,495
2315 DATA12,849,225,335,258,375
2320 DATA12,888,145,260,230,295
2325 DATA12,899,145,260,230,295
2330 DATA12,58,170,255,211,380
2335 DATA12,8419,315,405,389,450
2340 DATA1,KIT,2940,4818,5490,5490
2345 DATA1,LIT KIT,0,0,1882,1882
2350 DATA1,PAD,0,0,140,140
2355 DATA1,SAL3,0,0,34,34
2580 DATA999,END,1,1,1,1

```

Program Listing 2. Distributor Organization

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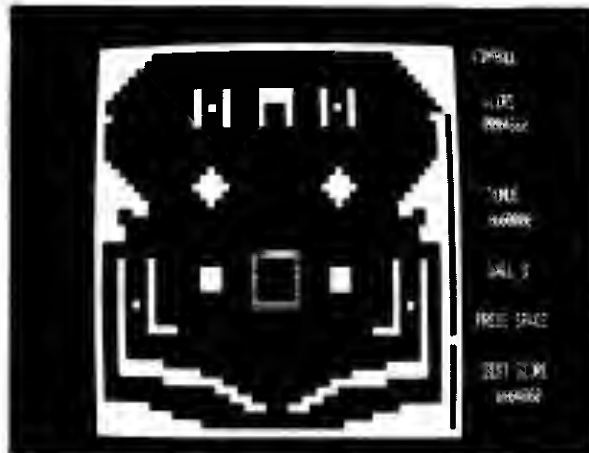
10 CLS
20 REM * DISTRIBUTOR SPONSORSHIP PROGRAM *
30 REM * COPYRIGHT 1979 FRED BLECHMAN *
40 PRINT:PRINT"THE PURPOSE OF THIS PROGRAM IS
TO ALLOW"
50 PRINT"YOU TO QUICKLY FIND THE SPONSOR AND GROUP LEAD
ER OF"
60 PRINT"ANY OF YOUR DISTRIBUTORS, AND ALSO TO FIND ALL
THE"
70 PRINT"DISTRIBUTORS UNDER ANY SPONSOR OR GROUP LEADER
...."
75 PRINT:PRINT"ASTERISK (*) MEANS NON-RENEWED DISTRIBUT
OR!!"
80 PRINT:PRINT"JUST FOLLOW THE INSTRUCTIONS AS
YOU GO."
90 PRINT:INPUT"PRESS ENTER WHEN READY....";Z$

```

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```

92 GOSUB 5100
95 CLS: PRINT:PRINT:PRINT"DO YOU WANT PRINTER OR SCREEN
? (PRINTER=1, SCREEN=0)";:INPUT P
100 CLS:PRINT:PRINT"WHICH OF THE FOLLOWING DO YOU WANT?
"
110 PRINT:PRINT"(1) DISTRIBUTOR'S SPONSOR & GROUP LEADE
R"
120 PRINT"(2) ALL DISTRIBUTORS UNDER A GROUP LEADER"
130 PRINT"(3) DISTRIBUTORS DIRECTLY SPONSORED BY SPONSO
R"
135 PRINT"(4) LIST ALL DISTRIBUTORS"
136 PRINT"(5) TWO GENERATIONS BELOW SPONSOR...."
137 PRINT"(6) DISTRIBUTORS NOT RENEWED"
140 PRINT:PRINT"(TO EXIT PROGRAM, PRESS BREAK KEY...)"
150 PRINT:INPUT"ENTER 1,2,3,4,5 OR 6.....";A
155 IF P=1 GOTO 170
160 ON A GOTO 200,300,400,500,600,700
170 ON A GOTO 5200,5300,5400,5500,5600,5700
200 CLS:PRINT:PRINT"DISTRIBUTOR'S LAST NAME?";:INPUT D$
210 READ A$,B$,C$,R
220 IF A$=D$ THEN GOTO 250
230 IF A$="END" GOTO 280
240 GOTO 210
250 PRINTTAB(5)"DISTRIBUTOR";TAB(25)"SPONSOR";TAB(45)"G
ROUP"
260 PRINTTAB(5)A$;:IFR=1 PRINT" ";
265 PRINTTAB(25)B$;TAB(45)C$
270 GOTO 285
280 PRINT:PRINT"NOT ON LIST. SPELLED CORRECTLY?";
285 RESTORE
290 PRINT:PRINT:INPUT"ANOTHER? YES=1,NO=0";X
295 IF X=1 GOTO 200
296 GOTO 100
300 CLS:PRINT:PRINT"GROUP LEADER'S NAME?";:INPUTG$
310 READ A$,B$,C$,R
320 IF C$=G$ GOTO 360
330 IF C$="END" GOTO 380
340 GOTO 310
360 PRINTA$;:IFR=1PRINT" ";:ELSE PRINT" ",
370 GOTO 310
380 PRINT C$
385 RESTORE
390 PRINT:PRINT:INPUT"ANOTHER? YES=1, NO=0";Y
395 IF Y=1 GOTO 300
396 GOTO 100
400 CLS:PRINT"SPONSOR'S LAST NAME?";:INPUT S$
410 READ A$,B$,C$,R
420 IF B$=S$ GOTO 460
430 IF B$="END" GOTO 480
440 GOTO 410
460 PRINT A$;:IF R=1 PRINT" ";:ELSE PRINT" ",
470 GOTO410
480 PRINT B$
485 RESTORE
490 PRINT:PRINT:INPUT"ANOTHER? YES=1,NO=0";Z
495 IF Z=1 GOTO 400
496 GOTO 100
500 CLS:PRINT"LISTING OF ALL DISTRIBUTORS:"
510 READ A$,B$,C$,R
520 PRINT A$;:IF R=1 PRINT" ";:ELSE PRINT" ",
530 IF A$="END" RESTORE:GOTO540
535 GOTO 510
540 PRINT:INPUT"AGAIN? YES=1,NO=0";N
550 IF W=1 GOTO 500
560 GOTO 100
600 CLS:OIMB$(100)
610 PRINT:PRINTTAB(15)"DISTRIBUTORS IN LINES OF SPONSOR
SHIP"
615 PRINTTAB(20)"(TWO LEVELS DOWN ONLY)":PRINT
620 PRINT:PRINT"GROUP LEADER'S NAME?";:INPUTG$
625 I=0:A=0:B$(A)=" "
630 READ A$,B$,C$,R
632 IF A$=B$(A) THEN A=A+1:GOTO630
640 IF B$=G$ PRINTTAB(I)A$;:IF R=1 PRINT" " ELSE PRINT
" "
645 IF B$=G$ I=I+5:GOTO900
650 IF B$="END" GOTO 670
660 GOTO630
670 PRINT:INPUT"AGAIN? YES=1,NO=0";V
675 RESTORE
680 IF V=1 CLS:GOTO610
690 GOTO 100
700 CLS:PRINTTAB(20)"NON-RENEWED DISTRIBUTORS!"
710 READ A$,B$,C$,R
720 IF R=1 PRINTA$,
730 IF A$="END" PRINT "END":RESTORE:GOTO750
740 GOTO 710
750 PRINT:INPUT"AGAIN? YES=1,NO=0";U
760 IF U=1 GOTO700
770 GOTO100
900 L$=A$:RESTORE
910 READ A$,B$,C$,R
920 IF B$=L$ PRINTTAB(I)A$;:IF R=1 PRINT" " ELSE PRINT
" "
925 IF B$=L$ GOTO910
930 IF B$="END" THEN B$(A)=L$:RESTORE:I=0:A=0:GOTO630
940 GOTO910
1000 DATA ABUNDO,CUPINO,SCOTT,0
1010 DATA AGUILERA,PARRY,PARRY,0
1020 DATA ALBAUGH,DAVIS,PARRY,1
1030 DATA ALENAN,OLSON,OLSON,0
1040 DATA ANDERSON,BURLEN,SCOTT,0
1045 DATA ARNOLO,GALLANT,OLSON,0
1050 DATA ARROYO,PARRY,PARRY,0
1070 DATA BABB,BLECHMAN,BLECHMAN,1

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1074 DATA BANKS,DIXON,SCOTT,0
 1076 DATA BARNES,PARRY,PARRY,0
 1080 DATA BAUM,BLECHMAN,BLECHMAN,0
 1090 DATA BAUTISTA,SCOTT,SCOTT,1
 1100 DATA BECKER,SCOTT,SCOTT,0
 1110 DATA BELLOG,BLECHMAN,BLECHMAN,0
 1120 DATA BERTONI,BLECHMAN,BLECHMAN,0
 1124 DATA BLANCO,OLSON,OLSON,0
 1130 DATA BLECHMANS,BLECHMAN,BLECHMAN,0
 1140 DATA BONDRA,SCOTT,SCOTT,0
 1150 DATA BOWEN,MUELLER,PARRY,0
 1152 DATA BORNCAMP,KAVON,KAVON,0
 1154 DATA BORUFF,OLSON,OLSON,0
 1160 DATA BRAMMER,BLECHMAN,BLECHMAN,0
 1164 DATA BREESE,BLECHMAN,BLECHMAN,0
 1170 DATA BRENNAN,BLECHMAN,BLECHMAN,0
 1180 DATA BRICKLEY,BLECHMAN,BLECHMAN,1
 1190 DATA BROSS,ROZAS,OLSON,0
 1192 DATA BROWN,TOPLIFFE,SCOTT,0
 1200 DATA BROWNE,MARTIN,OLSON,0
 1210 DATA BRUNS,SCOTT,SCOTT,0
 1220 DATA BRUSIE,JORDANC,SCOTT,0
 1230 DATA BURBANK,THOMPSON,SCOTT,0
 1234 DATA BURLEWS,BURLEW,SCOTT,0
 1240 DATA BURLEW,SCOTT,SCOTT,0
 1250 DATA BUTT,OLSON,OLSON,0
 1260 DATA BYE,DAYS,DAYS,0
 1270 DATA BYRAM,MUELLER,PARRY,0
 1280 DATA BYRD,THOMPSON,SCOTT,0
 1284 DATA CALDERON,BLECHMAN,BLECHMAN,0
 1290 DATA CALLAHAN,MUELLER,PARRY,0
 1300 DATA CARPENTER,MUELLER,PARRY,1
 1310 DATA CARSTENSEN, CARSTENSEN, LOCKWOOD, 1
 1320 DATA CARSTENSEN, LOCKWOOD, LOCKWOOD, 0
 1330 DATA CARTER, CARSTENSEN, LOCKWOOD, 0
 1340 DATA CARVER, HEGGL, SCOTT, 0
 1350 DATA CASTELL, WILSON, SCOTT, 0
 1360 DATA CECI, OLSON, OLSON, 0
 1370 DATA CHARETTE, SCOTT, SCOTT, 0
 1380 DATA CHASE, BURLEW, SCOTT, 1
 1390 DATA CHEVALIER, MUELLER, PARRY, 1
 1400 DATA CLARK, MARTIN, OLSON, 0
 1410 DATA COKER, SENSENBAUGH, FROMM, 1
 1420 DATA CONANT, SCOTT, SCOTT, 0
 1424 DATA CONEJO, TOPLIFFE, SCOTT, 0
 1430 DATA CONTRERAS, SCOTT, SCOTT, 0
 1440 DATA CRAMER, BLECHMAN, BLECHMAN, 1
 1450 DATA CROSS, OLSON, OLSON, 1
 1454 DATA CUMMINGS, DAYS, DAYS, 0
 1460 DATA CUPINO, STODDARD, SCOTT, 0
 3320 DATA UNDERHILL, KENT, KENT, 0
 3330 DATA URIAS, OLSON, OLSON, 0
 3340 DATA URQUIDI, THOMPSON, SCOTT, 0
 3350 DATA VAN WORMER, BLECHMAN, BLECHMAN, 0
 3360 DATA VEGA, BLECHMAN, BLECHMAN, 0
 3370 DATA VOLMERANGE, SCOTT, SCOTT, 0
 3380 DATA WADE, RADDATZ, OLSON, 0
 3390 DATA WALES, MUELLER, PARRY, 0
 3400 DATA WALINSKI, DAYS, DAYS, 0
 3410 DATA WATKINS, OLSON, OLSON, 1
 3420 DATA WEBER, DONALDSON, OLSON, 0
 3430 DATA WEIGEL, OLSON, OLSON, 0
 3440 DATA WEISS, GEORGE, SCOTT, 0
 3450 DATA WHITE, BLECHMAN, BLECHMAN, 0
 3460 DATA WILKEN, OLSON, OLSON, 1
 3470 DATA WILLIAMS, OLSON, OLSON, 0
 3480 DATA WILLIAMS, DIXON, SCOTT, 0
 3490 DATA WILLIAMST, MARTIN, OLSON, 1
 3500 DATA WILSON, SHELLMAN, SCOTT, 0
 3510 DATA WITTMAN, ICKES, SCOTT, 1
 3520 DATA WOODBRIDGE, BLECHMAN, BLECHMAN, 1
 3530 DATA WRIGHT, MUELLER, PARRY, 1
 3540 DATA YANCEY, STODDARD, SCOTT, 1
 5000 DATA END,END,END,0
 5100 CLS:PRINT:PRINT ONLY SOME OF THE DISTRIBUTORS
 IN THIS
 5105 PRINT"ORGANIZATION ARE SHOWN IN THIS LIST TO ILLUS
 TRATE"
 5110 PRINT"HOW THE PROGRAM WORKS. YOU'LL WANT TO PUT IN
 THE"
 5115 PRINT"NAME OF YOUR OWN DISTRIBUTORS. TO DO THIS:"
 5120 PRINT"(1) TYPE 'DELETE 1000-3540' AND ENTER
 5125 PRINT"(2) ENTER YOUR OWN DATA STATEMENTS, AS FOLLO
 WS:"
 5130 PRINT" DATA DISTRIBUTOR,SPONSOR,GROUP,0"
 5135 PRINT" (IF NOT RENEWED, USE 1 INSTEAD OF 0)"
 5140 PRINT:PRINT"LEAVE 10 SPACES BETWEEN LINE NUMBERS F
 OR LATER NAMES,"
 5145 PRINT"AND BE SURE LAST DATA STATEMENT IS: DATA END
 ,END,END,0"
 5150 PRINT:INPUT"PRESS ENTER TO CONTINUE.....";Z\$
 5155 RETURN
 5200 CLS:PRINT:INPUT"DISTRIBUTOR'S LAST NAME";D\$
 5205 LPRINT:LPRINT"DISTRIBUTOR'S LAST NAME?";D\$
 5210 READ A\$,B\$,C\$,R
 5220 IF A\$=D\$ THEN GOTO 5250
 5230 IF A\$="END" GOTO 5280
 5240 GOTO 5210
 5250 LPRINTTAB(5)"DISTRIBUTOR";TAB(25)"SPONSOR";TAB(45)
 "GROUP"
 5260 LPRINTTAB(5)A\$;IFR=1 LPRINT" *";
 5265 LPRINTTAB(25)B\$;TAB(45)C\$
 5270 GOTO5285
 5280 LPRINT:LPRINT"NOT ON LIST. SPELLED CORRECTLY??"
 5285 RESTORE

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```

5290 PRINT:PRINT:INPUT"ANOTHER? YES=1, NO=0";X
5295 IF X=1 GOTO5200
5296 GOTO100
5300 CLS:PRINT:INPUT"GROUP LEADER'S LAST NAME";G$
5302 LPRINT:LPRINT"GROUP LEADER'S LAST NAME?";G$
5305 C=1
5310 READ A$,B$,C$,R
5320 IF C$=G$ GOTO 5360
5330 IF C$="END" GOTO 5380
5340 GOTO 5310
5360 LPRINTA$;:IF R=1 LPRINT" *",:ELSE LPRINT" ",
5365 C=C+1:IF C=5 THEN LPRINT:C=1
5370 GOTO5310
5380 LPRINTC$
5385 RESTORE
5390 PRINT:PRINT:INPUT"ANOTHER? YES=1, NO=0";Y
5395 IF Y=1 GOTO 5300
5396 GOTO 100
5400 CLS:PRINT:INPUT"SPONSOR'S LAST NAME";S$
5402 LPRINT:LPRINT"SPONSOR'S LAST NAME?";S$
5405 C=1
5410 READ A$,B$,C$,R
5420 IF B$=S$ GOTO 5460
5430 IF B$="END" GOTO 5480
5440 GOTO 5410
5460 LPRINTA$;:IF R=1 LPRINT" *",:ELSE LPRINT" ",
5465 C=C+1:IF C=5 THEN LPRINT: C=1
5470 GOTO 5410
5480 LPRINTB$
5485 RESTORE
5490 PRINT:PRINT:INPUT"ANOTHER? YES=1, NO=0";Z
5495 IF Z=1 GOTO 5400
5496 GOTO 100
5500 CLS:PRINT:PRINT"LISTING OF ALL DISTRIBUTORS IN PRO
CESS..."
5502 LPRINT:LPRINT"LISTING OF ALL DISTRIBUTORS:"
5505 C=1
5510 READ A$,B$,C$,R
5520 LPRINT A$;:IF R=1 LPRINT" *",:ELSE LPRINT" ",
5530 IF A$="END" RESTORE:GOTO5540
5532 C=C+1:IF C=5 THEN LPRINT:C=1
5535 GOTO 5510
5540 PRINT:INPUT"AGAIN? YES=1,NO=0";W
5550 IF W=1 GOTO 5500
5560 GOTO 100
5600 CLS:DIMB$(100)
5605 PRINT:PRINT"TWO-LEVEL LINE OF SPONSORSHIP..."
5610 LPRINT:LPRINTTAB(15)"DISTRIBUTORS IN LINES OF SPON
SORSHIP"
5615 LPRINTTAB(20)"(TWO LEVELS DOWN ONLY)":LPRINT
5620 PRINT:INPUT"GROUP LEADER'S LAST NAME";G$
5622 LPRINT:LPRINT"GROUP LEADER'S LAST NAME?";G$
5625 I=0:A=0:B$(A)=" "
5630 READ A$,B$,C$,R
5632 IF A$=B$(A) THEN A=A+1:GOTO5630
5640 IF B$=G$ LPRINTTAB(I)A$;:IF R=1 LPRINT" *" ELSE LP
RINT" "
5645 IF B$=G$ I=I+5:GOTO 5900
5650 IF B$="END" GOTO 5670
5660 GOTO 5630
5670 PRINT:INPUT "ANOTHER? YES=1, NO=0";V
5675 RESTORE
5680 IF V=1 CLS:GOTO5610
5690 GOTO 100
5700 CLS:PRINT:PRINT"NON-RENEWED DISTRIBUTORS BEING LIS
TED..."
5702 LPRINT:LPRINTTAB(20)"NON-RENEWED DISTRIBUTORS!!"
5705 C=1:LPRINT
5710 READ A$,B$,C$,R
5720 IF R=1 LPRINTA$,
5725 IF R=1 THEN C=C+1:IF C=5 THEN LPRINT:C=1
5730 IF A$="END" LPRINT"END":RESTORE:GOTO5750
5740 GOTO 5710
5750 PRINT:INPUT"AGAIN?OUTYES=1, NO=0";U
5760 IF U=1 GOTO 5700
5770 GOTO 100
5900 L$=A$:RESTORE
5910 READ A$,B$,C$,R
5920 IF B$=L$ LPRINTTAB(I)A$;:IF R=1 LPRINT" *" ELSE LP
RINT" "
5925 IF B$=L$ GOTO 5910
5930 IF B$="END" THEN B$(A)=L$:RESTORE:I=0:A=0:GOTO5630
5940 GOTO 5910

```

Program Listing 3. Bookkeeper

```

100 REM * COPYRIGHT FRED BLECHMAN 1978 * VERSION 9/8/
79
110 REM * SHOWS PAGE, MONTHLY AND RUN TOTALS *
120 DEFDBL A-L,S
130 CLS:PRINT
140 PRINT"SIMPLIFIED BOOKKEEPING":PRINT
150 PRINT"THE PURPOSE OF THIS PROGRAM IS TO ALLOW
YOU TO"
160 PRINT"ADD UP TO TWELVE COLUMNS OF FIGURES AT ONCE,
SUCH AS IN"

```

```

170 PRINT "A SIMPLE LEDGER BOOK. FOR EXAMPLE, USE COLUM
N 1 AS THE"
180 PRINT "AMOUNT OF AN EXPENSE, AND THE OTHER ELEVEN C
OLUMNS FOR"
190 PRINT "EXPENSE CATEGORIES. COLUMN 2 MIGHT BE MERCHA
NDISE, COLUMN"
200 PRINT "3 MIGHT BE UTILITIES, AND SO ON. THE AMOUNTS
ENTERED ALL"
210 PRINT "FALL IN COLUMN 1 AND ARE TOTALLED WHEN 0 ENT
ERED."
220 PRINT:PRINT
230 PRINT "    FORMAT ALLOWS TOTALS TO $ 99,999,999.001
!"
240 PRINT:PRINT
250 INPUT "WHEN READY TO PROCEED, HIT 'ENTER' ";A$
260 REM * INITIALIZE VALUES AT ZERO *
270 A=0:B=0:C=0:D=0:E=0:F=0:G=0:H=0:I=0:J=0:K=0:L=0:M=0
:P=0:R=0:S=0:W=0:X=0:Y=0
280 S1=0:B1=0:C1=0:D1=0:E1=0:F1=0:G1=0:H1=0:I1=0:J1=0:K
1=0:L1=0
290 S2=0:B2=0:C2=0:D2=0:E2=0:F2=0:G2=0:H2=0:I2=0:J2=0:K
2=0:L2=0
300 CLS:PRINT:PRINT
310 PRINT "    ENTER THE AMOUNT AND COLUMN # FOR EACH
EXPENSE":PRINT
320 PRINT "    ENTER 0 FOR COLUMN TOTALS
330 A=0:B=0:C=0:D=0:E=0:F=0:G=0:H=0:I=0:J=0:K=0:L=0:S=0
340 IF R=1 THEN S1=0:B1=0:C1=0:D1=0:E1=0:F1=0:G1=0:H1=0
:I1=0:K1=0:L1=0
350 X=0:Y=0:P=0:M=0:R=0
360 PRINT:PRINT
370 INPUT "AMOUNT";A
380 IF A=0 THEN 560
390 S=S+A
400 INPUT "    COLUMN";X
410 IF (X<2)+(X>12)PRINT "COLUMN ENTRY ERROR!! ONLY 2-12
VALID":GOTO400
420 REM * SELECT COLUMN AND ADD TO PREVIOUS TOTAL *
430 ON X-1 GOTO 440,450,460,470,480,490,500,510,520,53
0,540
440 B=B+A:GOTO550
450 C=C+A:GOTO550
460 D=D+A:GOTO550
470 E=E+A:GOTO550
480 F=F+A:GOTO550
490 G=G+A:GOTO550
500 H=H+A:GOTO550
510 I=I+A:GOTO550
520 J=J+A:GOTO550
530 K=K+A:GOTO550
540 L=L+A
550 GOTO 370
560 CLS:PRINT:PRINT** PAGE * TOTALS":PRINT:GOTO 580
570 CLS:PRINT:PRINT** MONTH ** TOTALS":PRINT
580 PRINT "COLUMN #TAB(12)"1";TAB(26)"2";TAB(40)"3";TAB
(54)"4"
590 IF M=1 GOTO 630
600 IF P=1 GOTO 620
610 PRINT "TOTAL $TAB(9)S;TAB(23)E;TAB(37)C;TAB(51)D;G
OTO640
620 PRINT "TOTAL $TAB(9)S1;TAB(23)B1;TAB(37)C1;TAB(51)D
1:GOTO640
630 PRINT "TOTAL $TAB(9)S2;TAB(23)B2;TAB(37)C2;TAB(51)D
2
640 PRINT:PRINT
650 PRINT "COLUMN #TAB(12)"5";TAB(26)"6";TAB(40)"7";TAB
(54)"8"
660 IF M=1 GOTO 700
670 IF P=1 GOTO 690
680 PRINT "TOTAL $TAB(9)E;TAB(23)F;TAB(37)G;TAB(51)H:GO
TO710
690 PRINT "TOTAL $TAB(9)E1;TAB(23)F1;TAB(37)G1;TAB(51)H
1:GOTO710
700 PRINT "TOTAL $TAB(9)E2;TAB(23)F2;TAB(37)G2;TAB(51)N
2
710 PRINT:PRINT
720 PRINT "COLUMN #TAB(12)"9";TAB(26)"10";TAB(40)"11";T
AB(54)"12"
730 IF M=1 GOTO 770
740 IF P=1 GOTO 760
750 PRINT "TOTAL $TAB(9)I;TAB(23)J;TAB(37)K;TAB(51)L:GO
TO780
760 PRINT "TOTAL $TAB(9)I1;TAB(23)J1;TAB(37)K1;TAB(51)L
1:GOTO780
770 PRINT "TOTAL $TAB(9)I2;TAB(23)J2;TAB(37)K2;TAB(51)L
2
780 REM * DRAW LINES TO SET ASIDE GRAND TOTAL *
790 V=15:FOR W=18 TO 43:SET(W,V):NEXT W
800 FOR V=9 TO 15:SET(W,V):NEXT V
810 IF P=1 GOTO 910
820 IF N=1 GOTO 960
830 PRINT
840 INPUT "DO YOU WANT TO ADD MORE ENTRIES? YES=1,NO=0"
;Y
850 IF Y=1 GOTO 360
860 S1=S1+S:B1=B1+B:C1=C1+C:D1=D1+D:E1=E1+E:F1=F1+F
870 G1=G1+G:H1=H1+H:I1=I1+I:J1=J1+J:K1=K1+K:L1=L1+L
880 PRINT:INPUT "ADDITIONAL PAGES THIS MONTH?? YES=1, NO
=0";W
890 IF W=1 GOTO 300
900 P=1:GOTO 570
910 S2=S2+S1:B2=B2+B1:C2=C2+C1:D2=D2+D1:E2=E2+E1:F2=F2+
F1
920 G2=G2+G1:H2=H2+H1:I2=I2+I1:J2=J2+J1:K2=K2+K1:L2=L2+
L1

```

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```

99 CLS
100 REM * COPYRIGHT 1979 FRED BLECHMAN *
110 REM * 7217 BERNADINE AVE., CANOGA PARK, CA 91307 *
120 PRINTTAB(15)"MONTHLY GROSS PROFIT STATEMENT"
130 LPRINTTAB(20)"MONTHLY GROSS PROFIT STATEMENT"
135 PRINT:LPRINT:X=128
140 PRINT@X,"ENTER YOUR NAME,STATE AND ADA #";:INPUTA$,
    B$,A
145 PRINT@X,"NAME:";A$," STATE:";B$," ADA #:";A;CHR
    $(30)
146 GOSUB1000
150 LPRINT"NAME:";A$," STATE:";B$," ADA #:";A;
160 PRINT@X,"REPORT MONTH AND YEAR (EXAMPLE:DEC,1978)";
    :INPUT C$,B
165 PRINT@168,"MONTH:";C$;B
166 GOSUB1000
170 LPRINT" MONTH:";C$;B
180 PRINT@X,"UPLINE DIRECT NAME, NUMBER";:INPUT D$,C
185 PRINT@X,"UPLINE DIRECT:";D$," HIS NUMBER:";C
190 LPRINT"UPLINE DIRECT:";D$," HIS NUMBER:";C
195 LPRINT:LPRINT:X=X+128
200 F=0;G=0;J=0;K=0;F1=0;G1=0
205 PRINT@X,TAB(2)"DISTRIBUTOR'S NAME";TAB(25)"BONUS %"
    ;
206 PRINTTAB(42)"BV";TAB(53)"BONUS"
207 GOSUB1000
210 LPRINTTAB(2)"DISTRIBUTOR'S NAME";TAB(25)"BONUS %";
220 LPRINTTAB(42)"BV";TAB(53)"BONUS"
230 PRINT@X,"DISTRIBUTOR % BRACKET,BV";:INPUT E$,D,F
235 IF E$="TOTAL" GOTO 300
236 G=D*F*.01
237 G=INT(G*100+.5)/100
238 PRINT@X,E$;TAB(28)D;TAB(40)F;TAB(52)G
240 LPRINT E$;TAB(28)D;TAB(40)F;TAB(52)G
250 F1=F+G;G1=G1+G;GOSUB1000
255 PRINT@X," ANY SERVICED? Y/N";:INPUT F$
260 IF F$="N" GOTO 230
270 PRINT@X," SERVICED DISTRIBUTOR,% BRACKET,BV";:I
    NPUT G$,H,J
271 PRINT@X,CHR$(30)
275 K=H*J*.01
276 K=INT(K*100+.5)/100
277 PRINT@X,TAB(5) G$;TAB(28)H;TAB(40)J;TAB(52)K
280 LPRINTTAB(5) G$;TAB(28)H;TAB(40)J;TAB(52)K
290 F1=F1+J;G1=G1+K;GOSUB1000
300 PRINT@X," ANY MORE SERVICED? Y/N";:INPUT H$
305 PRINT@X,CHR$(30)
310 IF H$="Y" GOTO 270 ELSE 230
315 PRINT@X,CHR$(30)
320 PRINT@X,CHR$(30)
330 PRINT@X,"ANY NON-QUALIFIED DD'S? Y
    /N";:INPUT J$
391 PRINT@X,CHR$(30)
392 IF J$="Y" GOTO 230
395 GOSUB1000:PRINT@X,"TOTALS:";TAB(40)F1;TAB(52)G1
400 LPRINT:LPRINT"TOTALS:";TAB(40)F1;TAB(52)G1
410 GOSUB1000;GOSUB1000:LPRINT
420 PRINT@X,"PERSONAL SALES THIS MONTH (RETAIL VALUE)";
    :INPUT L
422 PRINT@X,CHR$(30)
425 PRINT@X,"LINE 3:PERSONAL RETAIL SALES";TAB(35)L
430 LPRINT"LINE 3:PERSONAL RETAIL SALES";TAB(35)L
435 GOSUB1000:PRINT@X,"LINE 4:TOTAL BV PURCHASES";TAB(3
    5)F1
440 LPRINT"LINE 4:TOTAL BV PURCHASES";TAB(35)F1
445 GOSUB1000:PRINT@X,"LINE 5:TOTAL BV SOLD";TAB(35)F1+
    L
450 LPRINT"LINE 5:TOTAL BV SOLD";TAB(35)F1+L
460 GOSUB1000:PRINT@X,"WHAT IS YOUR BONUS BRACKET?";:IN
    PUT M
465 PRINT@X,"LINE 6:BONUS BRACKET";TAB(35)M;"%"
470 LPRINT"LINE 6:BONUS BRACKET";TAB(35)M;"%"
475 F2=(F1+L)*M*.01
476 F2=INT(F2*100+.5)/100
478 GOSUB1000:PRINT@X,"LINE 7:PERFORMANCE BONUS";TAB(35
    )F2
480 LPRINT"LINE 7:PERFORMANCE BONUS";TOCONT5)F2
485 GOSUB1000:PRINT@X,"LINE 8:BONUSES PAID OUT";TAB(35)
    G1
490 LPRINT"LINE 8:BONUSES PAID OUT";TAB(35)G1
495 GOSUB1000:PRINT@X,"LINE 9:BONUS GROSS PROFIT";TAB(3
    5)F2-G1
500 LPRINT"LINE 9:BONUS GROSS PROFIT";TAB(35)F2-G1
505 L1=L*.3;L1=INT(L1*100+.5)/100
508 GOSUB1000:PRINT@X,"LINE 10:RETAIL PROFIT";TAB(35)L1
510 LPRINT"LINE 10:RETAIL PROFIT";TAB(35)L1
520 GOSUB1000:PRINT@X,"ENTER SERVICING FEES. IF NONE, E
    NTER 0";:INPUT O
521 PRINT@X,CHR$(30)
525 IF O<>0 PRINT@X,"LINE10A:SERVICING FEES";TAB(35)O
530 IF O<>0 LPRINT"LINE 10A:SERVICING FEES";TAB(35)O
540 GOSUB1000:PRINT@X,"ENTER ANY 3% DD BONUS, IF NONE,
    ENTER 0";:INPUTN
541 PRINT@X,CHR$(30)
545 PRINT@X,"LINE 11:3% DD BONUS";TAB(35)N
550 LPRINT"LINE 11:3% DD BONUS";TAB(35)N
555 GOSUB1000:PRINT@X,"LINE 12...TOTAL GROSS INCOME";TA
    B(35)F2-G1+L1+O+N
560 LPRINT"LINE 12....TOTAL GROSS INCOME";TAB(35)F2-G1
    +L1+O+N
565 LPRINT:LPRINT:LPRINT
570 PRINT:PRINT
600 END
1000 X=X+64
1010 IF X>832 THEN X=832
1020 IF X=832 THEN PRINT:PRINT
1030 RETURN

```

Program Listing 4. Monthly Gross Profit Statement

```

10 CLS
15 CLEAR(100)
20 PRINTTAB(20)"MONTHLY GROSS PROFIT STATEMENT"
30 PRINT:INPUT"INSTRUCTIONS? Y/N";I$
31 IF I$="N" GOTO90
40 CLS:PRINT:PRINT"      THIS PROGRAM IS DESIGNED TO DO
      ALL THE"
45 PRINT"CALCULATIONS OF YOUR SA-434 MONTHLY GROSS PROFIT STATEMENT."
50 PRINT"IT WILL PRINT ON BOTH THE SCREEN AND THE PRINTER. IF YOU"
60 PRINT"DON'T HAVE A PRINTER CONNECTED, DELETE ALL 'L' PRINTS"
70 PRINT"STATEMENTS WHEN THEY APPEAR IN THE PROGRAM LISTING OR"
75 PRINT"THE PROGRAM WILL 'FREEZE UP'!"
80 PRINT:PRINT"      JUST FOLLOW THE PROMPTS. WHEN YOU WANT THE"
82 PRINT"TOTALS OF THE BV AND BONUS COLUMNS (2A & 2B), ENTER"
84 PRINT"'TOTAL,0,0'....."
86 PRINT:INPUT"PRESS ENTER TO CONTINUE.....";A$
90 CLS:PRINT@325,"IF YOU ARE USING A PRINTER, BE SURE IT IS"
92 PRINT"TURNED ON, OR AT LEAST CONNECTED, OR THE PROGRAM WILL"
93 PRINT"FREEZE UP!"
95 PRINT:INPUT"PRESS ENTER TO START PROGRAM.....";A$

```

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Simple Graphics

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This simple graphics program for the TRS-80 fits easily into a 4K Level II system. The coded program is in BASIC and requires less than 1700 bytes. The remaining RAM is used for storing graphic information input from the keyboard.

What It Does

The user is given a blinking cursor in the upper left-hand corner of the screen. From this location he can move the cursor using the arrow keys. The cursor leaves a trail wherever it goes.

Several options are available to the user: the trail can be lit or not; the cursor can be double width, but seen only every other horizontal position; the screen can be cleared along the way; or, when the user likes his art work, he can tell the computer to duplicate what he has done.

The computer follows everything step by step, beginning at the location where the cursor was last placed.

The program automatically wraps around, so if the cursor comes to one of the four edges of the screen, it continues at the

opposite side of the screen.

The only keys recognized during the program are the arrow keys to direct the cursor; the S key to turn the trail of the cursor on or off; the B key (big) to make the cursor and its trail narrow or wide; the CLEAR key to clear the screen; the G key (go) to initiate the duplicating process; the BREAK key to stop the program and the SHIFT@ key to make the program pause.

All other keys are ignored except when signaling the computer to resume after a pause.

Using the wide and narrow command (B key) several consecutive times makes the art work appear to flash. Using the cursor trail (S key) or the wide and narrow (B key) commands alternately causes every other duplication to be an opposite.

Simple patterns seem to be the most effective for display.

Theory of Operation

The program, divided into four

modules, is designed for speed.

The first module contains instructions from lines 0 to 9. The second module initializes values and extends from line 10 to line 50. All values are stored, so the computer is not slowed down by making conversions.

The ASCII values of the keys to be used are also saved, as is the location in memory where the keyboard input is to be saved.

The third module, line 90 to line 210, is for keyboard input. The SET and RESET statements are used to rapidly blink the cursor at its current location whether or not the trail is lit.

Once input from the keyboard is received, line 110 either marks or erases the location, while line 120 converts the key value to an ASCII value.

Because the user wants a fast response, nested IF statements are used. Line 130 is the first of these. Each section of the nested IF is set off by a down ar-

row (linefeed and return) to make it easy to read the IF statement. Line 130 checks for the arrow keys.

If an arrow key is pressed, the ELSE corresponding to the IF is activated. The ELSE stores a number code for that key in A and changes the horizontal (H) or vertical (V) position. The IF statement within the ELSE checks whether or not the screen limits have been exceeded and adjusts accordingly.

If the pressed key is not an arrow key in line 200, another nested IF group is used. Line 200 checks for the other keys that may be used. If the pressed key is not part of the set, then the program only returns to line 100 for the next keyboard input.

If a keyboard input is recognized after the number code is stored in A, line 150 takes two inputs at a time and stores them every other time into RAM, starting at location 19000, using the POKE statement.

Program Listing

```
0 CLS
1 REM TED HOMMEL, W7LFL, CHEYENNE, WYO. 4/15/79
2 REM ALL RIGHTS GIVEN AS PUBLIC DOMAIN BY AUTHOR.
3 PRINT"SIMPLE GRAPHICS FOR THE TRS-80."
4 PRINT:PRINT"ARROW KEYS MOVE CURSOR"
5 PRINT"S KEY WILL TOGGLE SPOT ON & OFF"
6 PRINT"B KEY WILL TOGGLE SIZE NARROW & WIDE"
7 PRINT"CLEAR KEY CLEARS SCREEN"
8 PRINT"G KEY SAYS GO AND DUPLICATE PATTERN WHERE YOU STOPPED."
9 PRINT:INPUT"PUSH ENTER TO START";B1$
10 CLEAR20:DEFINT A-Z
20 A=0:C0=A:C1=1:C2=2:C3=3:C4=4:CX=127:CY=47:C5=5:C6=6:C7=7
30 N=8:C8=8:C9=9:CA=10:CN=91:S=83:B=A:D2=A:Q1=A:H=0:V=0
40 CL=31:E=69:G=71:BI=66:I=18999:I0=I+C1
50 K$="":N$=K$:B1$=CHR$(23):B2$=CHR$(28)
90 CLS
```

```

100 SET(H,V):K$=INKEY$:RESET(H,V):IF K$=N$ THEN 100
110 IF Q1=C0 THEN SET(H,V) ELSE RESET(H,V)
120 A=ASC(K$)
130 IFA<>C9THEN
IFA<>CATHEN
IFA<>C8THEN
IFA<>CNTHEN
GOTO200
ELSEA=C3:IFV=C0THENV=CYELSEV=V-C1
ELSEA=C2:IFH=C0THENH=CXELSEH=H-C1
ELSEA=C1:IFV=CYTHENV=C0ELSEV=V+C1
ELSEA=C0:IFH=CXTHENH=C0ELSEH=H+C1
140 IF A>M THEN 100
150 IF D2=C0 THEN D=A*M:D2=C1:I=I+C1 ELSE D=D+A:D2=C0:POKE I,D
160 IF A<>C7 THEN 100 ELSE POKE I,D:D2=C0:GOTO400
200 IFA<>STHEN
IFA<>BITHEN
IFA<>CLTHEN
IFA<>G THEN
GOTO100
ELSEA=C7
ELSEA=C6:B=C0:CLS
ELSEA=C5:IFB=C0THENB=C1:PRINTB1$:ELSEB=C0:PRINTB2$:
ELSEA=C4:IFQ1=C0THENQ1=C1ELSEQ1=C0
210 GOTO140
400 FOR L=10 TO I
410 IF D2=C0 THEN D1=PEEK(L):A=INT(D1/M):D1=D1-A*M:D2=C1 ELSE D2=C0:A=D1
430 IFA<>C0THEN
IFA<>C1THEN
IFA<>C2THEN
IFA<>C3THEN
IFA<>C4THEN
GOTO500
ELSEIFQ1=C0THENQ1=C1ELSEQ1=C0
ELSEIFV=C0THENV=CYELSEV=V-C1
ELSEIFH=C0THENH=CXELSEH=H-C1
ELSEIFV=CYTHENV=C0ELSEV=V+C1
ELSEIFH=CXTHENH=C0ELSEH=H+C1
440 IF Q1=C0 THEN SET(H,V) ELSE RESET(H,V)
450 IF D2=C1 THEN D2=C0:A=D1:GOTO430
460 NEXT L
500 IFA<>C5THEN
IFA<>C6THEN
D2=C0:GOTO400
ELSEB=C0:CLS
ELSEIFB=C0THENB=C1:PRINTB1$:ELSEB=C0:PRINTB2$:
510 GOTO450

```

The POKE and PEEK method of storage saves space by using only one-half of a byte per keyboard input. That is four times less storage than if each keyboard input was stored in an integer dimensioned array (DEFINT and DIM).

Once the letter G is pressed, line 160 POKes what remains into memory and jumps to the fourth module.

Module Four

Module four reads instructions by PEEKs from memory. The result is displayed on the screen. A loop is set up from the beginning of POKed memory to the end. When the loop runs out of instructions, it starts over with the first instruction.

However, the location of the cursor does not change because of the restart.

Line 410 unpacks the stored input one byte at a time. Line 430 is one of those nested IF statements that allows fast action once the coded number is found. ■

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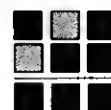
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This is an 80 user's true story.

In the Beginning

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deposit. Actually, it was two orders: I ordered the computer and printer separately, so a delay in one unit wouldn't hold up the other.

Paraphernalia First

I started waiting, but, not-so-patiently. About mid-July 1978, I got a call from Radio Shack. My computer came?! No. The printer came. Drat! A printer without a computer! Some salesman.

August came and I had to return to college. It was several weeks into the semester before my computer arrived. Two weeks later I managed to get home for a weekend. Without unpacking, I gathered everything together and took stock. The Screen Printer turned out to be a thinly disguised SCI Corporation Rotary Printer.

I set up the computer, without the printer connected, for its first test. I pressed the ON button and presto! "MEMORY SIZE?" came right up. Everything was working fine. I turned the computer off and connected the Screen Printer to the expansion port.

I turned the computer back on and . . . CRASH. No "MEMORY SIZE?", just a display full of garbage. The RESET button had no affect. Hmmm . . . I turned everything off and disconnected the printer.

When I turned the computer back on, everything was fine again.

There was nothing to do but call Radio Shack. The salesman on the phone couldn't help me, but called his regional repair center and got back to me.

When he told me the Screen Printer was not compatible with Level II, I was really ticked off.

To cool my temper, the salesman gave me several alternatives: I could receive a full, cash refund, or I could trade the printer in for their Quick Printer. The price of the Quick Printer was \$100 less than the Screen Printer, but it needed the expansion interface, another \$300.

I decided to trade for the Quick Printer and expansion interface, even though it meant shelling out an extra \$200.

The Hardware and Keyboard

The keyboard, only 16 x 8 x 3½", contains the computer itself, up to 16K RAM, Level I or Level II ROMs and connections for the power supply, cassette recorder, video display and an expansion port.

The keyboard itself is the standard-sized, 53 key type. New 16K RAM models also include a numerical keypad. For me, typing on this keyboard is a

real pleasure. Usually, anyway. Several weeks after getting the computer, the infamous keyboard keybounce, in which more than one character is displayed when a key is pressed, made itself known. It started with the comma key, spread to the C key, and eventually to several others. Finally, I had to get off my duff and do something about it.

I did three things: I *carefully* cleaned the contacts beneath the offending keys; I found a sheet of transparent plastic to use as a dust cover; and I went to Radio Shack and got a free KBFIX system tape. Cleaning the key contacts really helped, but the problem will return in time as dust creeps in.

KBFIX is a machine language program loaded via the SYSTEM command that modifies how the keyboard accepts input. When KBFIX is running, everything runs normally, except the keybounce and 50 bytes of RAM are gone.

The Video Display

The video display is just a 12" black and white TV, except that it has a slightly wider bandwidth to accept the kind of output the computer supplies and no tuner.

The normal output to the video display is composed of 64 characters per line and 16 lines

In May, 1978, I decided to take the plunge and buy a micro-computer. Some of the factors I had to consider included reliability, service, features, software support and last, but certainly most important, cost. I considered the choices available and decided on Radio Shack's TRS-80, because it was right for my use and it fit into my modest budget.

Selling my portfolio and pledging my first-born son to Radio Shack, I ordered what they called their engineer system, a Level II, 16K RAM TRS-80 (\$988) and the Radio Shack Screen Printer (\$599).

I was told by Radio Shack salesmen that the waiting period for Level II units was two months and even longer for peripherals like the Screen Printer. I accepted this fact and plunked down my 10 percent



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4. Display variables: keeps track of a select group of variables that you select (and can change at any time) and permits the examining of these. A command swaps the screen memory out to high memory and replaces it with your variable chart. Another command brings your screen memory back from high memory and it is complete (like graphics programs that are hard to continue without the graphics, can now be continued like you never stopped).
5. Stacking programs: permits you to stack one or more basic programs in high memory while you work on or run another program. You can call these programs down at any time to merge to the program that you are working. (limited only by the memory size of your machine).

This program sold on cassette for \$29.95 and works in Level II or DOS (works under TRSDOS 2.1, 2.2, 2.3, NEWDOS 2.1 we do not have NEWDOS-80 yet to test) and comes with 13 page manual. Automatically relocates itself to not interfere with other machine language programs that you have in high memory.

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Level I.

Level I BASIC, along with cassette loading and saving routines and a small error message routine, is contained in about 4K of ROM. It's available immediately on power-up. No intermediate steps are needed — turn it on and start programming.

Level I BASIC is what amounts to a Tiny BASIC-like interpreter with some additions. Its statements are summarized in Table 1. An interesting feature of Level I BASIC is Radio Shack's dialect for Level I. This shorthand can effectively save a significant amount of memory, according to the manual.

Two rather severe limitations of Level I BASIC deal with DIMensions and strings. Only one DIMension, A(n), is allowed in Level I. However, since n can be any number up to the maximum available memory, it's possible to get around multiple DIMensions with a little work.

Strings are another problem. Only two string variables, A\$ and B\$, are allowed, and only 16 letters may be held in each.

Since Level I doesn't allow string comparisons, uses for A\$ and B\$ are limited.

Saving and loading programs to and from cassettes are accomplished through the CSAVE and CLOAD commands. The cassette transfer rate is a rather slow, but reliable, 250 baud. During a CLOAD, two little stars appear on the video display and flash on and off if the program is loading properly. Program variables may be written to or read from the cassette using the PRINT# and INPUT# statements.

Program errors are dealt with simply. There are only three error messages: WHAT? (in which the computer doesn't understand the command); HOW? (in which the computer understands the command, but can't follow it, like a NEXT without a FOR-TO); and SORRY (in which the computer has run out of memory).

When an error occurs, the proper error message is displayed, along with a ? next to the offending statement.

The Level I users manual de-

serves the high praise it has been given. I recommend this manual to anyone who wants to learn BASIC, whether he owns a TRS-80 or not.

Level II BASIC

In my humble opinion, Level II BASIC is where the TRS-80 really shines. It's very easy to use, especially for an experienced programmer, versatile, powerful and pleasantly surprising.

Radio Shack's Level II BASIC is an extended BASIC written by Microsoft and contained in 12K of ROM. Table 2 summarizes BASIC's repertoire.

Unlike Level I's limited variable set, Level II allows just about anything. Variables can be composed of one letter, two letters, or a letter and a number between zero and nine. Any number of variables can be DIMensioned, and even multi-dimensional arrays are allowed. Variable names of more than two characters are allowed, but cannot contain a reserved word.

For example, while NAME is a valid variable (the computer only sees the first two letters, NA), PRINTER isn't because it contains PRINT, which would cause all sorts of problems.

Finally, any variable may be declared as a specific type of variable: single precision (8 digits); double precision (16 digits); integer or string. As you can imagine, quite a number of combinations are possible. Not counting DIMensions or decla-

rations, there are around 900 variable combinations!

Level II BASIC doesn't include a shorthand like Level I, but according to the Level II manual, memory is used more efficiently with Level II than with Level I. Two abbreviations that are available in Level II are ? for PRINT and ' for REM.

The Operating System

Level II TRS-80s can do quite a bit more than just load and run programs.

When the computer is first turned on, "MEMORY SIZE?" is displayed. This gives you the opportunity to reserve memory for special purposes, like a machine language subroutine. The only way to unreserve this memory is turn the computer off and on again. After reserving memory, the TRS-80 enters its Command Mode and displays READY.

While in the Command Mode, I can: enter programs (from the keyboard or from tape, using CLOAD or SYSTEM); RUN programs (with a line tracing option) or modify programs (using the optional EDIT mode).

Saving and loading programs in Level II is similar to Level I, with some improvements. The Level II cassette transfer rate is twice as fast as Level I, at 500 baud. In addition, tape programs may be verified to insure a proper save, using CLOAD? and may have a one-character file name for future CLOADs. With the addition of an expansion interface, two cassette re-

Common BASIC statements in Level-II: Those statements in Table 1, plus ...

ASC	ATN	CHR\$	CLEAR
COS	DELETE	DIM	ELSE
ERL	ERR	EXP	FRE
LEN	LEFT\$	LLIST	LOG
LPOS	MID\$	PEEK	POKE
POS	USING	RANDOM	RESUME
RIGHT\$	SGN	SIN	SQR
STR\$	TAN	USR	VAL

Radio Shack additions to Level-II:

Those statements in Table 1, plus ...

AUTO (automatic line numbering)
CDBL (converts variable to double precision)
CINT (converts variable to integer precision)
CSNG (converts variable to single precision)
CLOAD "X" (loads program named X from cassette)
CLOAD? (verifies cassette load)
CSAVE "X" (saves program named X to cassette)
DEFDBL (defines variables as double precision)
DEFINT (defines variables as integer precision)
DEFSGN (defines variables as single precision)
DEFSTR (defines variables as strings)
EDIT (enters editing mode)
ERROR (depending on use, enters error program trap, or generates a fictitious error)
FIX (truncates variable)
INKEY\$ (returns a one-character string from keyboard without pausing program execution)
INP (inputs one byte from a specified port)
STRING\$ (prints a special type of string)
SYSTEM (loads and executes machine-language programs)
OUT (sends byte to port)
TRON (turns on line tracing mode)
TROFF (turns off line tracing mode)
VARPTR (returns memory address of a specific variable)

Table 2. Level II BASIC Summary

Command	Effect
n-SPACEBAR	Move cursor n spaces to the right.
n-←	Move cursor n spaces to the left
SHIFT-↑	Escape from I, H, X commands below.
L	List line.
X	Go to end of line and enter Insert (I) command.
I	Insert at current position.
A	Cancel all changes and restart.
H	Delete rest of line from current position and enter Insert (I) command.
nD	Delete n characters, starting at current position.
nC	Change n characters, starting at current position.
nSc	Search for the nth occurrence of character c.
nKc	Delete line from current position to the nth occurrence of character c.
Q	Cancel all changes and return to normal operation.
E	Save all changes and exit to normal operation.
(ENTER)	Same effect as E, above.

Table 3. Level II Edit mode commands (lowercase letters indicate optional parts of a command.)

fill the screen. Normally, if there are more than 16 lines of text, the display will scroll up, eliminating the topmost lines while the new lines appear at the bottom of the screen.

Both Level I and Level II BASIC offer alternatives to this mode of operation. Common to both BASICs are the CLS, AT (@ in Level II) and SET(X,Y) commands. CLS clears the display and homes the cursor to the top left of the screen (this allows for paging text instead of scrolling). AT, when modifying a PRINT statement, prints to a specific screen location. The SET(X,Y) statement lights up point (X,Y) for graphics. RESET(X,Y) will turn the point off, and POINT(X,Y) tests to see if a point is on or off.

The 128 by 48 point resolution graphics may not be the best in the industry, but I'm sure Radio Shack had to deal with a trade-off between the ease of programming the graphics and their resolution. The ease of plotting points is directly proportional to the number of points there are to plot.

Level II computers offer several additional methods of getting information to the video display. Double-wide characters in which PRINTCHR\$(23) or SHIFT→ converts the display to 32 characters per line but the screen should be cleared before this change is made or the characters currently on the screen turn to garbage. The CHR\$ function prints characters, control commands or specific sets of graphics points. Finally, you can POKE information to the screen as memory.

A little bit more about this last point. If you will notice, 64 characters on a line times 16 lines make 1024 printing positions, or 1K of characters. Convenient, huh? Thinking about this for a while, what does it indicate to you? That's right, the video display is seen as memory to the computer. This permits both a formatted screen for the PRINT AT statement and the ability to POKE information directly to the video display.

Cassette Control

Included with my computer system was a Radio Shack CTR-41 cassette recorder. At the time I bought the computer, the CTR-41 was the standard issue for the TRS-80. As of this writing, computers are being supplied with CTR-80s, almost identical to the CTR-41s, except that the fast-forward and rewind buttons will work with all the remote plugs in.

Dealing with fast-forwarding and rewinding tapes proved to be easier than I thought. I didn't want to keep fooling around with the remote plugs to the cassette, so I fooled the computer into doing it for me. All I had to do was tell the computer to CLOAD (cassette load), which freed the cassette motor. I could then do anything I wanted with the recorder, pressing the RESET button to get back to normal operation.

Then I got the expansion interface and found out I couldn't do that anymore. Pressing the RESET button while the interface is connected automatically clears the memory! Any program in memory is lost. I started to hunt around for an alternative.

I found it in Micro-Mega's Cassette Control Unit. This little (2½ x 5 x 1") box gives both manual control and audio monitoring of the cassette recorder. The unit inserts itself between the computer and the cassette recorder using existing cables—there is no physical modification to either the computer or recorder. It also eliminates some of the possible ground loops that can mess up cassette recordings. Even though I've been using the unit for over eight months and admit that it has improved my cassette handling, I still haven't resolved whether it was worth the \$37.50 price tag.

The Expansion Interface

Radio Shack's expansion interface is a kind of traffic cop between the TRS-80 computer and the various available peripherals. It routes signals to and from printers, disks, modems and whatever else someone

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thinks up. It contains the circuitry for driving line printers, disk drives, a second cassette recorder and a real time clock. It also has space for up to 32K of RAM, and an RS-232-C output port, and extends the TRS-80 bus system from the computer's expansion port (to which the interface is connected), to the interface itself. It all fits snugly under the video display.

While the expansion interface operates just fine, I have several complaints. One is the price. Three hundred dollars is a lot to pay for a box that only connects other boxes.

Another is the instruction manual. Frankly, I don't think much of it. There are several inaccuracies in the instructions, ranging from vague directions to outright mistakes. Also, there is very little in the manual about the actual operation and uses of the unit.

Finally, the real time clock is awkward to use without a disk. While the clock is on, the cassette recorder can't be used either.

The Quick Printer

In contrast to the expansion interface, I'm very pleased with the Quick Printer (actually a disguised Centronics P-1). This little ($4\frac{1}{4} \times 13 \times 10\frac{1}{2}$ ") guy can do things some of Radio Shack's bigger, more expensive printers can't do.

As with the Screen Printer described earlier, the Quick Printer uses four-inch wide, aluminum-coated paper. The Quick

Printer is electrostatic—the aluminum is burned off the paper, exposing a black backing. While this method looks kind of funny and may not be appropriate in some situations, it's cost-effective (cheaper than a \$1200 line printer), versatile, and the aluminum paper makes excellent plain paper copies.

Like the other Radio Shack line printers, the Quick Printer prints only when it's told to, using the LPRINT or LLIST statements. It's possible to print one thing to the video display, while something completely different may be going to the printer.

Unlike other line printers, there are quite a few surprising features only the Quick Printer has. The Quick Printer can print both upper and lowercase letters. Yes, it is possible to get lowercase out of an unmodified TRS-80. And it can print in three different, software selectable modes, no less. Also, software selectable is an audible signal and an underlining capability.

The manual supplied with the printer is very thorough. Topics covered include the different software codes, the theory of operation and maintenance. An abrasive cleaning paper is even included. Very nice.

Level I BASIC

Although I bought a Level II TRS-80, the Level I manual was generously included with my package. In addition, I recently purchased a Level I overlay for my unit, so I think I can speak with a little knowledge about

corders may be used. Machine language programs can be loaded and run using the SYSTEM command.

If a program is being entered from the keyboard, an automatic line numbering option, AUTO, is available. Using AUTO, the first line number and the increment between lines can be specified. AUTO 100,25, for example, will generate line numbers of 100, 125, 150, etc.

Anyone who has done any programming at all knows what frustration debugging a program can cause. Only superior self-control has kept me from bashing a computer or a terminal to bits on more than one occasion.

Level II offers a couple of sane alternatives—TRACE and EDIT. TRACE displays the line numbers being executed on the video display. This lets me know if my program is running the way I want it to. EDIT does just what the name implies—selectively inserts and deletes information from a line listing. The EDIT subcommands are listed in Table 3.

While the subcommand itself is not displayed, its effects are immediate. I would estimate my program debugging time has been cut a fourth or a half using the combination of TRACE and EDIT.

Error-Handling

Level II's error handling is far superior to Level I's. ON ER-

ROR GOTO in a BASIC program allows me to trap errors within a program, correct them and continue, without ever stopping the program. There are almost two dozen error messages in Level II, compared to Level I's three.

Level II error messages are summarized in Table 4. Normally, when Level II comes across an error in a program, it specifies the error and what line it occurred in. If there is no error trap within the program, it stops executing.

Syntax errors are the exception—they cause the computer to stop and automatically enter the EDIT mode!

The Last Word

I've really been pleased with my TRS-80. While I may have lingered on some problems I've had with it, they are minor, compared with the overall operation of the system. ■

References

- Cowan, "A Look at TRS-80 Peripherals," *Microcomputing*, April, 1979, p. 22.
- King, "TRSpeed-up," *Microcomputing*, Sept., 1979, p.138.
- Rugg, Feldman, "Basic Timing Comparisons," *Microcomputing*, June, 1977, p. 66 and October, 1977, p. 20.
- Radio Shack, *User's Manual for Level I*.
- Radio Shack, *Level II Basic Reference Manual*.

Common BASIC statements in Level-I:

AGS	CONT	DATA	END
FOR/NEXT/STEP	GOSUB	GOTO	IF/THEN
INPUT	INT	LET	NEW
ON/GOTO/GOSUB	PRINT	READ	REM
RESTORE	RETURN	RND	RUN
STOP	TAB		

Radio Shack additions to Level-I:

CLOAD (load program from cassette)
CLS (clear video screen)
CSAVE (save program to cassette)
INPUT# (input data from cassette)
MEM (amount of RAM left)
POINT (graphics on/off test)
PRINTAT (print to specific video location)
PRINT# (saves data to cassette)
RESET (turns off graphics point)
SET (turns on graphics point)

Table 1. Level I BASIC Summary

Code	Abbreviation	Meaning
1	NF	NEXT without FOR
2	SN	Syntax error
3	RG	RETURN without GOSUB
4	OD	Out of data
5	FC	Illegal function call
6	OV	Overflow
7	OM	Out of memory
8	UL	Undefined line
9	BS	Bad subscript (out of range)
10	OD	Redimensioned array
11	/O	Division by zero
12	IO	Illegal direct
13	TM	Type mismatch
14	OS	Out of string space
15	LS	String too long
16	ST	String formula too complex
17	CN	Can't continue
18	NR	No RESUME
19	RW	RESUME without error
20	UE	Unprintable error
21	MO	Missing operand
22	FD	Bad file data
23	L3	Disk BASIC only

Table 4. Level II Error Messages

Even though the machine is basically the same, several modifications are available from Radio Shack.

Modification Update

Scott Richards
Address withheld
by request

Occasionally, I sit back during a quiet evening and consider the recent history of technology, especially electronics.

Although I am a rather young chap, approaching my mid 30's, I can remember when television sets really hit the market, when solid state portable radios made their entrance, as well as the hydrogen bomb, the first man-made satellites in orbit. I can also remember the invention of the LASER a mere 19 years ago, when man landed on the moon, when a 7400 TTL I.C. cost \$2.50, and an 8080 microprocessor I.C. cost \$350.00—and that was only about five years ago.

Nowadays, if you shop judiciously, you can pick up an I.C. for five bucks. That same five bucks will buy you a calculator that would have cost you \$150.00 seven years ago.

Micro Proliferation

What does all this mean to us consumers, especially since we have a keen interest in microcomputing? For one thing, with several single-board micros for sale at a price significantly less than that 8080 of five years past, small businessmen can purchase a computer without fear of bankruptcy. Schools and

other institutions can buy several and include them in courses at lower and lower grade levels.

Best of all, you and I can even afford one.

Although it had many predecessors, no single entry in the field of microcomputers has generated so much interest as Radio Shack's TRS-80, and we are seeing little more than the tip of the proverbial iceberg.

It's been nearly two years since the introduction of the TRS-80. In that time, while the basic computer has remained essentially unchanged, Radio Shack has made several improvements, all of which are available to TRS-80 customers at no charge. Radio Shack has either published news of these improvements in their *Microcomputer Newsletter* or made them available to customers through their retail store and Computer Centers.

I mention this because I have seen a great deal of misinformation and missing information in articles in many publications, and I feel that a review of these improvements might benefit those who have not heard of them, or have been misinformed.

The *Radio Shack Microcomputing Newsletter* I mentioned is an informative monthly bulletin containing programming hints and new product releases for TRS-80 users. It's free to owners, and if you've bought a TRS-80 and are not receiving it, I

suggest you get in touch with a Radio Shack Company store or Computer Center. Or write a letter including your name, address, type of equipment and serial numbers to *Microcomputer Newsletter*, 700 One Tandy Center, Fort Worth, Texas 76102.

Some Improvements Reviewed

● If you own a Level II BASIC TRS-80, are experiencing cassette loading problems, and your computer does not have Radio Shack's cassette load modification, then your CPU may be sent to have the modification installed.

If you take it to a company Radio Shack store, it will be sent to the appropriate repair center. If you live near a Radio Shack Computer Center, the work can be done there.

Be sure to remember this modification is made to the computer keyboard and *not* to your tape recorder, as was mistakenly indicated in a recent issue of the newsletter.

All current production Level II computers have the modification already installed and can be identified by a -1 suffix to the catalog number on the bottom label. If there is a stamp or any reference to XRX-III on the bottom, that also indicates the modification. XRX-III is the nomenclature of the added PCB. The modification should eliminate all loading problems.

I also suggest you use a

volume level on your tape recorder halfway between that recommended for Level I and Level II and never touch the volume control again.

● If you use a model CTR-80 tape recorder, then look in the battery compartment at the date code label. If it precedes 3A9, then there is a possibility of a glitch being written to tape under certain conditions. This can easily be remedied at no cost to you. Once again, it will have to be sent to a Radio Shack repair center via a Radio Shack store or taken to a Computer Center.

● How many times have you pressed a key that resulted in multiple entries of the character? Hmmm, almost thought you had a TRS-80 with a unique feature—repeating characters!

Unfortunately, this is most unwanted, and something can be done about it. The cause of the problem is dust and other airborne contaminants between the switch contacts under the keycaps. Though it's not a permanent fix, some type of cover should be used on the CPU when it is not in use. I suggest you buy or make yourself a cover, or at least lay a dust free cloth over the keyboard.

Remember to allow the unit to ventilate when powered up or you may find yourself in need of more than just a factory update! Also, try to keep your system a reasonable distance from heat vents and other air ducts. They

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Apparat, Inc., announces the most powerful Disk Operating System for the TRS-80®. It has been designed for the sophisticated user and professional programmer who demands the ultimate in disk operating systems.

NEWDOS/80 is not meant to replace the present version of NEWDOS 2.1 which satisfies most users, but is a carefully planned upward enhancement, which significantly extends NEWDOS 2.1's capabilities. This new member to the Apparat NEWDOS' family is upward compatible with present NEWDOS 2.1 and is supplied on Diskette, complete with enhanced NEWDOS + utility programs and documentation. Some of the NEWDOS/80 features are:

- New BASIC commands that supports files with variable record lengths up to 4095 Bytes long.
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35, 40 or 77 track 5" mini disks drives or 8" disk drives, or any combination.

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- Powerful chaining commands.
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without disturbing the resident program.

- Upward compatible with NEWDOS 2.1 and TRSDOS 2.3.
- Includes Superzap 3.0 and all Apparat 2.1 utilities.

NEWDOS/80 with all of the NEWDOS + utility programs, many of which have been enhanced, is priced at just \$149.00 and is available at most TRS-80 dealers. Previous NEWDOS owners may receive full trade in allowance toward the purchase of NEWDOS/80 by including with their order the serial number of their NEWDOS 2.1 diskette, the price paid and where purchased. In most cases that purchase price will be subtracted from the price of NEWDOS/80. As with NEWDOS 2.1, NEWDOS/80 relies on the TRSDOS and Disk Basic Reference Manual published by Radio Shack. NEWDOS/80 documentation supports its enhancements and upgrades only.



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are dust blowers.

Radio Shack provides machine language software with all new Level II computers to use if keybounce becomes a problem. The cassette also includes a program activating the Real Time Clock in the expansion interface and is available to customers with Level II TRS-80's delivered before the origination of the keyboard debounce software.

Clean Your Keyboard

A simple alternative to the debounce software is to clean your keyswitch contacts (did I say "simple"?). Of course, this can apply to both Level I and Level II computers, though keybounce problems are relatively rare with Level I machines.

Each keyswitch mechanism consists of a keycap, plunger, spring and two leaf spring type contacts, one solid and one trifurcated (three separations resulting in four fingers). A partition in the plunger keeps the contacts separated until the key is depressed, the partition moves downward, out of the way, and the contacts close.

The keybounce problem occurs when dust or smoke, for example, on the contacts allow them to "make" or "break" two or more times during only one keystroke.

I have seen several suggested methods for cleaning these contacts. Since they each require inserting some device or material between the contacts, I am afraid that some of you will meet with disaster and be left with copper spaghetti where your contacts used to be. For the benefit of the uninitiated, your contacts are VERY DELICATE!

The safest, most effective method I have found is to:

1. Gently remove the key cap using direct, upward pressure only. Pry the cap from the sides.

2. Thoroughly saturate a cotton swab with alcohol. (Ethyl is best, methyl is very good, isopropyl will do.)

3. Carry a very large drop of alcohol on the swab and gently touch it to the top of the contacts, allowing the alcohol to flow to wash them clean.

4. Move the plunger up and

down with your finger a few times while the contacts are still wet. Be careful not to damage the contacts with your finger.

5. Replace the key cap and check for keybounce. A second drop may be necessary for stubborn cases.

Do not be concerned about the excess alcohol, as it will evaporate quickly and not damage anything. I suggest you clean your keys as infrequently as possible and only the ones that need it. Also, should a plunger come out as you pull the keycap, separate them before putting the plunger back. Make sure, when inserting the plunger into the housing, that the spring is properly located inside and that the partition separates the contacts without damaging them. Then go ahead and press the plunger down into the housing until the retaining tabs catch.

Of course, all this is rather academic if you are using a disk system with TRSDOS version 2.3. It contains a keyboard debounce routine that is automatically loaded and activated on power up. If you are still using an older version, the debounce software can be transferred from tape to disk.

- If you are using a TRS-80 Expansion Interface, especially with additional RAM, then two modifications should be of interest to you. The first is a buffered cable.

Originally, the expansion interface utilized a flat ribbon cable between it and the CPU. The buffered cable was added later to improve its operation.

More recently, another improvement was added in the form of a grey cable with a DIN type connector on it. This is used in conjunction with the buffered cable and is installed in both the CPU and expansion interface. Both the buffered cable and the DIN connector have to be installed at a Radio Shack repair center or Computer Center.

Alarm Project

Wouldn't it be nice to start running a lengthy program, get up and do something else and not have to worry about when to

INPUT some more data? A super simple home-brew project yields a very handy device for your TRS-80—an audible alarm. You can't get any more simple than a piezoelectric buzzer and one transistor and still have your silent partner get your attention from another room. It connects to the AUX IN plug of your tape recorder.

The device operates parallel to the cassette data output line going into the AUX input of your tape recorder (Fig. 1). You can leave it on line permanently, as it does not interfere with the data transmission to the recorder.

Obviously, you could build the device into the CPU and eliminate the cabinet, miniature phone jacks and battery. It makes for a neat installation, but also voids any warranty you may have on your computer; so, proceed at your own risk.

I suggest using an external enclosure. The circuit operates simply. Transistor Q1 serves as a saturated switch to enable current to flow from the nine volt battery to the piezoelectric buzzer. This is accomplished with some very easy and brief software commands that you can alter to respond differently at different prompts.

But how are we going to turn on an external device using a cable that provides data to the input of a tape recorder?

Inspect the schematic of your computer. Data is transferred from the computer to the outside world via a flip-flop. It just so happens that the Q output of this flip-flop is biased in such a way that when the Q output is high, the DC voltage at the cassette jack (output pin, of course) is at approximately 0.8 volts. When the Q output goes

low, so does this DC voltage, to about 0.4 volts.

Here we are with a DC voltage that is going from a level below the threshold voltage required to turn on a silicon PN junction (0.6–0.7V) to a level just above. All we have to do now is type the appropriate software command to change those voltage levels, and the alarm will sound.

Construction is also simple. Use a small piece of perf board or a terminal strip. I have glued the transistor to the back of the buzzer's plastic case with instant bonding adhesive, soldered the appropriate wires to the transistor leads and insulated the connections with heat shrink tubing.

A piece of PVC tape to hold the leads on the back of the case helps to keep them from breaking, should the wires be moved around excessively. A terminal strip is probably the safest and easiest method.

Drill two holes in the box to accommodate the miniature phone jacks. Mount the buzzer, terminal strip (etc.), battery and phone jacks into the cabinet. Wire the circuit; construct a reasonably short length of audio cable with a miniature phone plug on each end to go from the alarm to the AUX input on the recorder, and you're in business, that is, if you wired it correctly. Double check your wiring and connections.

The cost depends entirely on your "junk box" and how dressy you want your alarm to be. If you have to buy everything (parts list), you can expect to spend approximately \$10 to \$12.

Software Commands

The software to drive this little rascal is easy. I'm sure you remember the TRS-80 uses a

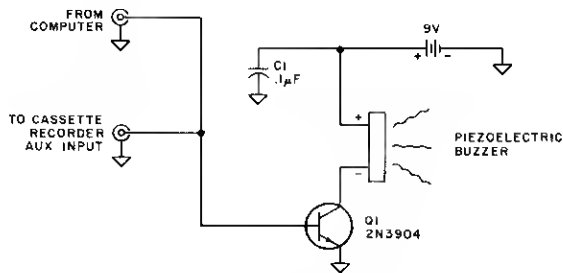


Fig. 1. Alarm Schematic

memory mapped system of addressing, but it does utilize one port and one port decoder for the recorder, 255D (FFH). From this we derive the following BASIC commands:

OUT 255,1—Turns alarm on
OUT 255,0—Turns alarm off

Using these commands in conjunction with some FOR-NEXT timing loops, we can make the alarm sound in any sequence we prefer. For example, consider the following program lines:

```
40000 OUT 255,1:FOR A=1 TO 450:
NEXT:OUT 255,0
```

This causes the alarm to sound a steady tone for approximately one second.

```
40000 FOR A=1 TO 5:OUT 255,1:
FOR B=1 TO 100:NEXT:OUT 255,0:
FOR B=1 TO 100:NEXT B,A
```

This causes the alarm to sound five brief pulses (approximately 1/5 second) with the length of time between pulses equal to the length of the pulses.

With just a little imagination, you can write software to create any tone sequence you want. The most practical applications that come to mind are several subroutines for different tone sequences to let you know when to input additional data, when a program execution has ended, when an error has occurred or when game sound effects are needed.

If you are using an expansion interface with your system either one of its cassette jacks (for recorder one or two) may be used, if the cassette select relay in the expansion interface is in the appropriate position.

This is no problem if you use the BASIC statement POKE

14308,X, where X = either 0 or 1. If X = 0, then cassette jack one is selected and remains selected until another command changes it—whether it be another POKE statement or a regular cassette command. Of course, X = 1 selects jack two.

There are a couple of things you should remember with regard to the alarm. The signal generated in the computer to select either 64 characters per line or 32 c.p.l., called MODESEL, can be affected by an OUT 255,X command.

If you activate your alarm while in the 32 c.p.l. mode, the computer reverts to 64 c.p.l. This is not disastrous, of course, but it may save you some frustration when trying to dress up your display with 32 c.p.l., while the alarm is sounding.

Also, during a CSAVE operation you can hear the data being sent to the cassette. Although the alarm's volume is much reduced, some may still find the noise objectionable.

If so, a switch can easily be added to the battery and the alarm completely disabled when data is sent to the recorder. You could also, more simply, disconnect the alarm from the computer during these operations.

You might note that the current requirements for the full alarm (the unit I built) are approximately 9 mA, and 4 mA with data being transferred.

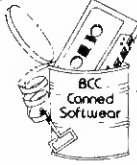
There you have it! Good luck with your alarm—it's one of the slickest items I have ever added to my TRS-80. ■

Note: Some TRS-80s are now appearing with a different keyboard, which can be recognized by its somewhat concave surface. This keyboard uses capacitance type switches, is sealed and should never need cleaning. Any attempt at removing a key-cap will result in permanent damage.

Qty.	Item	R.S. Catalog #
1	Piezoelectric buzzer	273-060
2	Miniature phone jack	274-297
2	Miniature phone plug	274-286
1	Terminal strip (perboard, etc.)	274-688
1	9 V Battery connector	270-325
1	NPN transistor (2N3904)	276-2010
1	.1 uF Capacitor	272-135
1	9 V Transistor type battery (alkaline)	
1	Cabinet (or box)	
1	Short length shielded audio cable	

Parts List

TM



TRS-80

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Find out how to use random and sequential access for your disk system.

Disk Files

William O'Brien
11 Dongan Place
New York, NY 10040

If you can believe anything in these days of intensive advertising hype, then believe that if there is any "real power" hidden somewhere inside a TRS-80 it's hiding inside the expansion interface, in the confines of the disk controller chip.

The disk function of the TRS-80 allows the volume manipulation of data at speeds which are phenomenal, compared to the capabilities of the cassette based system. However, disks necessitate the precise use of language patterns to efficiently achieve their potential.

Data Files

There are two modes available to us for handling data files through Disk Basic. One is termed sequential and the other random. For the simple storage of programs, a cassette based system is more than adequate.

However, when one is working with data files, the shortcomings of cassette files are glaring. Waiting for data at the end of a half hour data tape or continually rewinding tape is dull and wastes time. Add to that the shortcomings of changing between program and data cassettes and the only conclusion for the serious TRS-80 user is that a disk based system is a must.

With Disk Basic simple program storage and retrieval is accomplished with the SAVE and

LOAD commands.

The complicated part is the handling of data files which cannot be simply LOADED or SAVED. The simplest method of handling data files is through sequential access techniques, which allow data to be placed on the diskette one datum at a time as it becomes available.

The computer contains 15 buffers or holding areas where it stores data. Each of these buffers holds 256 bytes of informa-

```
40 PRINT
50 PRINT "TO END PROGRAM TYPE
  IN A NUMBER LARGER THAN 200
  FOR 'AGE'"
60 PRINT @ 320,"1. AGE?";
70 INPUT A:IF A>200 THEN 1000
80 PRINT @ 384,"2. HEIGHT (USE
  FEET.INCHES)?";
90 INPUT H
100 PRINT @ 448,"3. WEIGHT?";
110 INPUT W
120 PRINT#1, A;H;W;
130 CLS
140 GOTO 30
1000 CLOSE 1: END
```

The program puts you into an endless loop that inputs and

specification, "USE FEET. INCHES" in line 80 lets us keep this as a numerically oriented file.

Line 120 is similar to a cassette print, printing the contents of buffer number 1 onto the disk. Line 140 loops the program back for more information. The conditional in line 70 ends the program with a jump to 1000 when the correct prompt is received.

Suppose our researcher decides the state of residence also has some bearing on the data. Attempting to program this additional data, we add the following:

```
112 PRINT @ 512,"STATE OF
  RESIDENCE ?";
114 INPUT S$
```

"... the only conclusion for the serious TRS-80 user is that a disk based system is a must."

tion, or one 255-byte string.

Information contained on the diskette is stored in units termed granules. Each granule is composed of five sectors.

Because a sector is a 256-byte storage bin, all data files occupy at least 1280 bytes of storage space, whether or not the actual length of the data is that long.

Assume you are working for a research scientist who has been gathering data to find a correlation between the height, weight and age of people. He has assigned you to enter all the data into a TRS-80. Your program might look like this:

```
10 CLS
20 OPEN "O",1,"RESEARCH"
30 PRINT "RESEARCH DATA PROGRAM"
```

stores all the data you have until you terminate it by typing in a number larger than 200 in answer to line 70.

Let's analyze the program to find out exactly what it is you are doing.

Program Analysis

All modes of file storage require that you first open one of the 15 available buffers. Sequential access requires that you specify whether the buffer will output or input the information. All access modes require a named file. Line 20 opens buffer number 1 for output (the 0 specifies this) from the buffer into a disk data file named Research.

Lines 60 through 110 accept the data from the keyboard. The

To correctly recover a string entry, when the computer inputs from the disk, it must see the string within quotation marks. The quotation marks must be stored in forms that the computer recognizes as delimiters. To do this we must use the decimal control code for the quote character, 34. Line 120 therefore looks like this:

```
120 PRINT#1,CHR$(34);S$;CHR$(34);A;H;W;
```

The computer understands that CHR\$(34) is a quotation mark and reads the enclosed word as a string with the appropriate delimiters.

Now our employer says, "Could you please print all that information out for me?" We do it like this:

```

10 CLS
20 OPEN "I",1,"RESEARCH"
30 IF EOF(1) THEN 1000
40 INPUT#1, S$,A,H,W
50 LPRINT S$,A,H,W
60 GOTO 30
1000 CLOSE 1: END

```

Line 20 opens the file for input (the I) to buffer number 1. Line 30 tells the computer that if it has reached the end of the data contained in the file (EOF is End Of File), then it can take a break.

Lines 40 and 50 input the data into the buffer and print it on your printer. Line 60 loops it back to look for the EOF, and if it finds it, line 1000 closes the buffer (and also the file) and ends the program.

Several words of caution in using CLOSE statements in the sequential access mode: Only close a buffer (and therefore the file) of an OUTPUT coded OPEN statement after you have stored all the data you want to store. Once CLOSED, any attempt to OPEN a buffer for output to an already existing file will erase the contents of that file.

Always CLOSE a buffer and file before KILLing it. If you don't, you will scramble the diskette beyond human comprehension.

I just finished telling you that you can't reOPEN a buffer for output to an already existing file, and your employer comes in to say he found 20 more pages of data. To accomplish this addition use two buffers, one to input the data from the previously closed file and the other to write it to a new file.

If all you do when the computer asks 'How Many Files?' is press the ENTER key, the computer will automatically assume you will not exceed three files. This is called the default value. With only two buffers used, we have not exceeded this value.

This program combines elements of both of the previous programs:

```

10 CLS
20 OPEN "I",1,"RESEARCH"
30 OPEN "O",2,"RESEARCH/TWO"
40 IF EOF(1) THEN 1000
50 INPUT#1, S$,A,H,W
60 PRINT#2,CHR$(34);S$;CHR$(34);
  A;H;W;
70 GOTO 40
1000 CLOSE 1

```

```

1010 PRINT "RESEARCH DATA PRO-
  GRAM"
1020 PRINT
1030 PRINT "TO END PROGRAM ENTER A
  NUMBER LARGER THAN 200 FOR
  'AGE:'"
1040 PRINT @ 320," 1. AGE ?";
1050 INPUT A: IF A 200 THEN 2000
1060 PRINT @ 384," 2. HEIGHT ?";
1070 INPUT H
1080 PRINT @ 448," 3. WEIGHT ?";
1090 INPUT W
1100 PRINT @ 512," 4. STATE OF
  RESIDENCE ?";
1110 INPUT S$
1120 PRINT#2,CHR$(34);S$;CHR$(34);
  A;H;W;
1130 GOTO 1010
2000 CLOSE 2: END

```

Lines 20 and 30 OPEN the two buffers we need, one for inputting the old data file, RESEARCH and the other for outputting the new file RESEARCH/TWO. The extension TWO is used in this case to keep the programs from becoming confused and causing a possible disk I/O error.

Again, line 40 is a trigger line in case all of the data in our original file has been read in. If so, it sends the program to line 1000 which CLOSEs the first buffer, since we are finished with the input operation.

Lines 50 and 60 take the raw data out of the first file and print it into the second. If we haven't reached the end of the data then the program loops back to line 40 again. Lines 1000 through 2000 are virtually the same as the original program that we used to print the data to disk.

Now you see, data files aren't that difficult to handle in sequential access. What bothers some people is the timing involved in this particular access mode. If you have typed in 100 or 200 groups of data, to retrieve the 187th group of the series, you must go through the other 186 groups before you can retrieve the 187th. If you find that you have to do it consistently, it becomes tedious.

Random Access

To overcome this fight with ennui, there is another method of file storage available to us through the TRS-80, random access. In general random access is a highly structured mode, requiring the clear and exact definition of variable length. Although it allows for only string storage, it provides a method of

converting numeric data to a generally more compressed string format.

Let's go back and refile all our data using random access techniques. You needed three numeric values: one for the height; one for the weight; and one for age. You also needed a string input for the state of residence.

To maintain efficiency with random access we utilize an entire buffer of information, or as many of the 256 bytes in the buffer as we can. To do this, we organize the buffer into fields of strings. (Remember, there are no numeric values *per se* in this mode.)

The state of residence is already input as a string, S\$. We still must define its field length.

Let's assume, for no specific reason, that the maximum length of S\$ will never exceed 17 characters. Next, you must define the age value. 'A' is a numeric character set and as such is not allowed. But three operations can be performed on 'A' to change its nature.

If you have been using Level II, you probably are familiar with the STR\$(n) function. This operation changes a numeric

value to a string. Disk Basic has three similar functions that convert a numeric value into a two- or eight-byte string. These are the MKI\$(n) for use with integers that do not exceed ± 32768 , MKS\$(n) for single precision numbers and MKD\$(n) for double precision numbers.

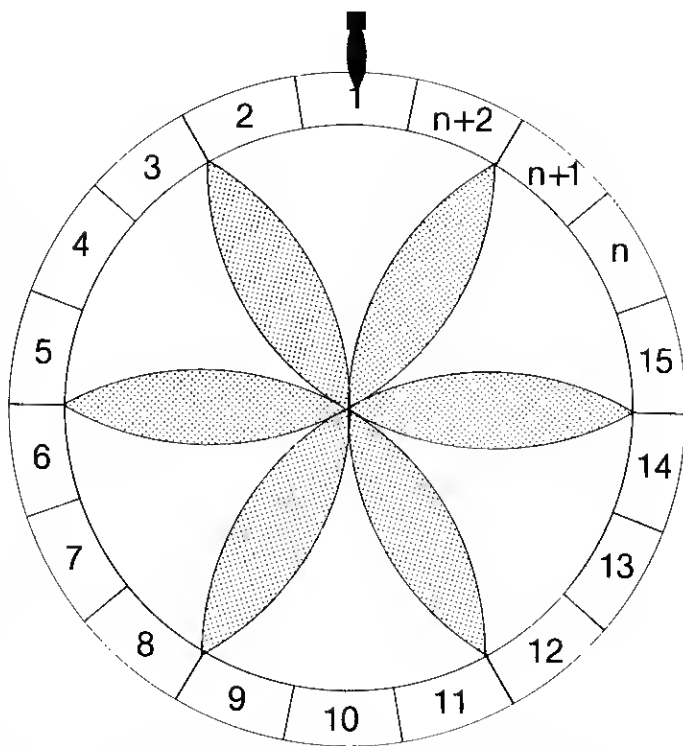
Practically, the range of 'A' will not exceed 125. Nor will you use fractional year values. You can therefore use the integer function on 'A'. This means that we will have a string value, MKI\$(A), whose length is two bytes.

Height is inputted as a decimal number, so it does not fulfill our integer requirement. However, since it will always be in single precision form, you can use that function to create a string MKS\$(H) with a length of four bytes.

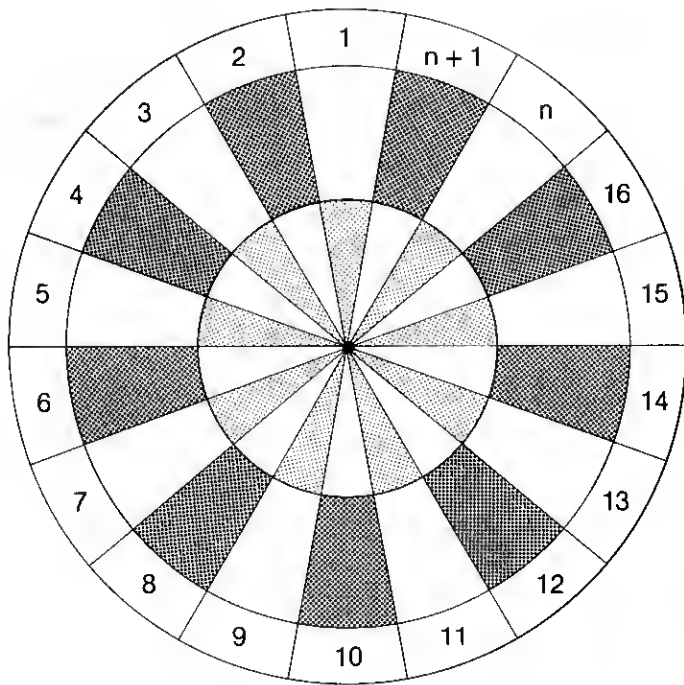
Weight will also always be an integer value, giving us the string MKI\$(W), with a length of two bytes.

So we have S\$, 17 bytes long; MKI\$(A), two bytes long; MKS\$(H), four bytes long and MKI\$(W), two bytes long.

In order to FIELD (set up the field dimension for the specified buffer) you have also to name



Sequential retrieval is similar to a wheel of fortune because a data file is retrieved by passing through all preceding data files.



Random retrieval uses the dart board approach: All data files are available, if you know how to use the "dart".

the fields you intend to use. We cannot use the names of the variables as the field names, because the field names are dimensional specifiers.

```
10 OPEN "R",1,"RESEARCH"
20 FIELD 1, 17 AS ST$, 2 AS AS, 4 AS HS, 2
   AS WS
```

The AS in this case is used to tell the computer that *n* is the length of the field named whatever name we have chosen. But we've got another problem here.

Random access handles only buffers full of information, a total of 256 bytes at a time, nothing smaller. The total length of our variables is only 25! That means that we are wasting 231 bytes of information. There's more structuring that will solve this too.

In Level II Basic you learned to handle groups of data in matrix form. You can take the length of each element defined in our field length statements and use a matrix.

We have 25 bytes of storable material and a 256 byte room to put it in. Efficiency dictates that we put 10 groups of data in the buffer each time.

Let's write out the lines first, and explain them later.

```
10 FOR PN = 0 TO 9
20 FIELD 1, (PN * 25) AS P$, 17 AS ST$(PN),
   2 AS AS$(PN), 4 AS HS$(PN), 2 AS WS$(PN)
30 NEXT PN
```

Line 10 set up the dimension of the matrix: a 10 element matrix, zero to nine inclusive.

Line 20 is the organizational statement for the FIELD. P\$ is a dummy variable that consists of the length of PN*25 that keeps moving the buffer pointer up past the last entered group of 25 bytes.

At the start, when PN = 0, you are at the beginning of the buffer. As PN is incremented, the pointer keeps pace, always 25 bytes ahead of its last value.

P\$ is never included in the buffer value, since you never assign it its own value. It simply points. ST\$(PN), AS\$(PN), HS\$(PN) and WS\$(PN) are all valid field names, organized into matrix format.

Let's shuffle some lines and see what happens:

```
10 OPEN "R",1,"RESEARCH"
20 FOR PN = 0 TO 9
30 FIELD 1, (PN * 25) AS P$, 17 AS ST$(PN),
   2 AS AS$(PN), 4 AS WS$(PN), 2 AS HS$(PN)
40 NEXT PN
```

Now that you've FIELDed the buffer, fill it with data. Simple input statements can be used:

```
50 PRINT "RESEARCH DATA PROGRAM"
60 PRINT
70 PRINT "TO TERMINATE PROGRAM
   ENTER A NUMBER LARGER THAN
   200 FOR AGE"
80 PRINT @ 320,"1. AGE?";
90 INPUT A; IF A > 200 THEN 2000
100 PRINT @ 384,"2. HEIGHT (USE
   FEET, INCHES)?";
110 INPUT H
120 PRINT @ 448,"3. WEIGHT?";
130 INPUT W
140 PRINT @ 512,"4. STATE OF
   RESIDENCE?";
150 INPUT S$
```

Now that you have all the data for the first group, how do you tell the computer this data has to be set into the buffer and at which point?

There are two ways. Disk BASIC provides us with two functions, LSET and RSET. Essentially they are the same, with the only difference being one of esthetics.

If, for instance, we input "IDAHO" as the state of residence, we might note that it is not 17 characters long as our FIELD statement requires. RSET or LSET solves this dilemma.

If we had LSET ST\$ = S\$ and S\$ = "IDAHO" as one of our program lines, then the computer understands you wish to place the value S\$ into the field specified by ST\$. In this specific case, the computer checks out the length ST\$ should have and then sets S\$ into that field at the left of its length and fills any remaining places with blanks.

If we used RSET instead, then the last five bytes of the field ST\$ are filled with S\$ and the leading 12 bytes are set with blanks. The choice is a personal one in most programs.

You can place data where you want it (in which element of the matrix) with another FOR-NEXT statement:

```
75 FOR PN = 0 TO 9
```

and continue where we left off:

```
160 LSET ST$(PN) = S$
170 LSET AS$(PN) = MK$(A)
180 LSET HS$(PN) = MK$(H)
190 LSET WS$(PN) = MK$(W)
200 :
210 NEXT PN
```

Writing Data to Disk

But how do you put the data onto the disk?

With Disk BASIC any buffer

opened with the "R" option (for random access) may have its contents written to the disk by using a PUT statement. In our program, the line would look like this:

```
220 PUT 1
```

This directs the computer to PUT the contents of buffer one onto the disk.

Optionally, you can select a file number and complete the statement: PUT 1, *n* where '*n*' is any integer from 1 to 335 inclusive, depending on the space available on the disk. In our case, that means a maximum of 3,350 data groups available for storage.

Knowing what data is where is important when you need it later. However, if we don't supply a number, the computer will assume that the first random file accessed is number one and increment that number by the value of one each time the file is accessed. If you chose to supply the file number, you too, must increment its value each time you PUT additional data onto the disk.

Now, conclude your storage program:

```
230 GOTO 55
2000 IF PN = 0 THEN 3000
2010 S$ = "": A = 0: H = 0: W = 0
2020 MC = PN: FOR PN = MC TO 9
2030 FL = 1: GOTO 180
```

Here's where you fill that blank line 200 that I know you've been wondering about:

```
200 IF FL = 1 THEN 2040
```

Continue with:

```
2040 NEXT PN
2050 PUT 1
3000 CLOSE 1: END
```

Line 230 sends the computer back into a loop to acquire more data. If there is no more, it jumps to line 2000. This line determines if a buffer has just been PUT to disk or not. If PN = 0, it means that you have just PUT the buffer, and it will branch to line 3000 which ends the program. If PN is greater than 0, you proceed with the 2000 series

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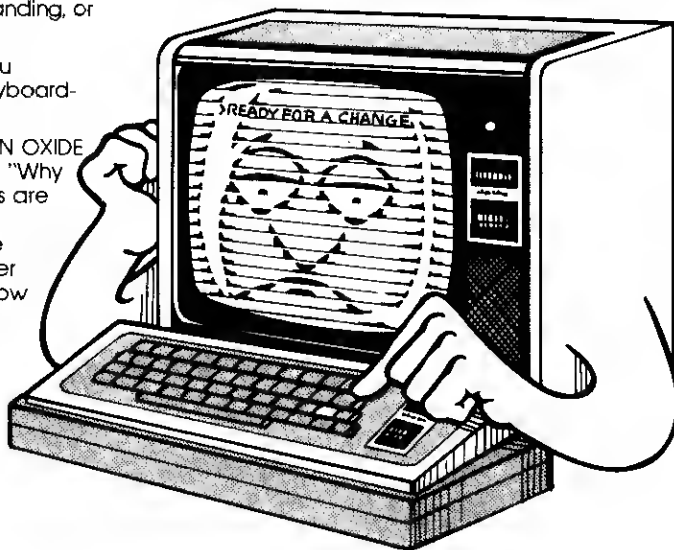
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statements.

If you were to simply PUT the last LSET information and close the buffer, the TRS-80 would assume that the last set of information higher than the current PN value was to be included in the present file (that is, all of the last matrix values higher than PN).

Line 2010 sets all values to null or zero. Line 2020 creates a new start value for the PN FOR-NEXT statement. Line 2030 sets a flag FL, to be used in line 200 as a pointer and sends the program on to line 160 to complete the data LSET. After that, line 2050 PUTs the completed buffer. The buffer is closed in line 3000 and the program is ended.

Let's say our employer isn't sure the correct data is entered for the 1895th group. He wants us to retrieve the data and check it out.

First, determine the relationship of any one group of data to the total number of data files. If you have stored, in total, 2000 data groups, at 10 groups per file, you have 200 files. If you wish to find one particular data group, the 1895th group, then its position is given by these formulas:

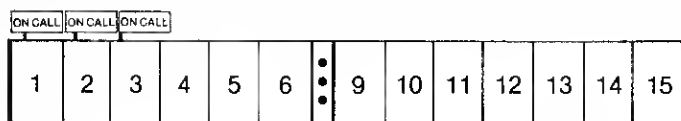
```
FN = INT(DN/10) IF FN <> DN/10
  THEN FN = FN + 1
PN = (DN - (INT(DN/10)*10)) - 1
  IF PN < 0 THEN PN = 9
```

Where DN is the data group number we wish, FN is the file number that contains that group, and PN is its position within the file.

This means if we want data group number 1895 we can find it this way:

```
FN = 189 = INT(1895/10)
```

Remember, we started our matrix at 0, not at 1. Since



Of the 15 buffers available, three are used by "How Many Files?". 290 bytes are tied up by each buffer assignment.

INT(1895/10) does not equal 1895/10, FN = 189 + 1 = 190; and PN = 4 = (1895-1890) - 1. Data group 1895 is contained in file number 190 at position four. Once you grasp the concept it's not that difficult.

How, do we extract a data group from the disk?

The actual programming is simple when you know the rules

```
5 OPEN "R",1,"RESEARCH"
10 FOR PN = 0 TO 9
20 FIELD 1, (PN*25) AS P$, 17 AS ST$(PN),
  2 AS AS$(PN), 4 AS HS$(PN), 2 AS WS$(PN)
30 NEXT PN
```

This is the standard opening of a random access file.

```
40 PRINT "320, 'WHAT DATA GROUP
  ARE YOU LOOKING FOR?";
50 INPUT DN
60 FN = INT(DN/10)
70 IF FN <> DN/10 THEN FN = FN + 1
80 PN = (DN - (INT(DN/10)*10)) - 1
90 IF PN < 0 THEN PN = 9
```

These lines make use of the formula we determined above. Disk BASIC random access techniques allow us a GET statement, the converse of the PUT command.

There is only one other thing we should worry about, and that is going past the last file in our grouping. This will produce an error message and terminate the program. To avoid this we use another Disk BASIC statement, LOF(n) gives us the last file number we have stored.

```
100 IF FN > LOF(1) THEN 3000
110 GET 1, FN
```

Now, just print the information that's inside the file. There is a bit of structuring involved in that also.

Restoring Data

When you stored the numeric data on the disk, you converted it into string data. This data, converted by either the MKI\$,

MKD\$, or MKD\$ functions, is not directly printable. Instead, you must restore the data to its original form.

Disk BASIC contains the functions CVI, CVS, and CVD which convert a two, four, or eight-character string (respectively) back to its numeric form.

Their use is strictly controlled by the original transposition command, meaning that where we used MKI\$ we must use CVI, with MKS\$ use CVS and with

"There is one other thing to worry about, and that is going past the last line in our grouping."

MKD\$ use CVD. The print (to screen) statement will therefore be:

```
120 PRINT SS$(PN), CVI(AS$(PN)),
  CVS(HS$(PN), CVI(WS$(PN)))
130 PRINT "896, 'ANOTHER DATA
  GROUP?";
140 ENS = INKEY$: IF ENS <> "Y"
  AND ENS <> "N" THEN 140
150 IF ENS = "N" THEN 2000
160 CLS: GOTO 40
2000 CLOSE 1: END
3000 CLS: PRINT "320, 'DATA COUNT
  EXCEEDS THE TOTAL OF FILES
  STORED"
3010 PRINT "384, 'PRESS ENTER TO
  CONTINUE...";
3020 ENS = INKEY$: IF ENS <> CHR$(13)
  THEN 3020
3030 CLS: GOTO 130
```

The use of 'PRINT' in 'INKEY\$' allows formatting of the screen prompts and inputted data. The actual format you choose may be anything you are comfortable with. CHR\$(13) is the TRS-80 code for a carriage return/linefeed, which is what occurs when you hit ENTER.

If our employer asks us to print out the entire list of data, the task will be no more difficult than the one above. We can pick up the program right after our FIELD definition statements:

```
40 FOR FN = 1 TO LOF(1)
50 GET 1, FN
60 FOR PN = 0 TO 9
70 IF CVI(AS$(PN)) = 0 THEN 1000
80 LPRINT SS$(PN), CVI(AS$(PN)),
  CVS(HS$(PN), CVI(WS$(PN)))
90 LPRINT CHR$(13)
100 NEXT PN
110 NEXT FN
```

1000 CLOSE 1: END

In line 40 use the LOF(1) statement to indicate the maximum number of files we can retrieve. In this case, we will retrieve all of them.

Line 70 uses the fact that we 'zeroed out' the final elements of our original matrix, and tells the program that it should close the buffer and end if it discovers the zero value. Without this the line printer would print nulls and

zeroes after the actual data had been disgorged. The other lines are straightforward print statements, conclusions of FOR-NEXT loops and finally the buffer closing and end.

If we maintain the same premise that we did with sequential access—you will find that the problem now is somewhat faster to solve. Picking up this variation of our program at the end of our FIELD statements:

```
40 IF FL = 1 THEN 140
50 EN = LOF(1)
60 GET 1, EN
70 FOR PN = 0 TO 9
80 IF CVI(AS$(PN)) = 0 THEN 120
90 NEXT PN
100 EN = EN + 1: P2 = 0
110 CLOSE 1: GOTO 130
120 P2 = PN
130 FL = 1: GOTO 5
140 FOR PN = P2 TO 9
```

This finds the last file PUT to disk and whether or not all 10 elements of the matrix within that file were set. Since this is our first run through the program the flag is not set, and we continue.

EN in line 50 is given the value LOF(1) for future reference. Line 60 is GETting the last file, after which lines 70 and 80 check for the last set element in that file. If it finds that the file is not filled with valid data, then the program branches to line 120, leaving the current file number, EN, as the one we are using, and sets the next matrix element of

that file, P2, equal to the element in which it found its first invalid data.

If all elements of the matrix are filled, the program continues to line 100 which increments the file by one and sets P2 equal to the first (the zero) element of the matrix. The flag is set at line 130 and the program is directed back to the beginning to OPEN the buffer again. This time so that we may add to it.

Since, during this run FL=1, the program is branched to line 140, which is the beginning of the input statements you created in lines 70 through 150.

There are a few differences here. We must set P2 equal to zero each time the PN loop runs out (after the NEXT PN line). We must change the PUT statement to reflect the number of the additional files (PUT 1,EN). EN must be incremented by a value of 1 after each PUT statement.

Which Method?

Keep in mind the two types of

filing techniques: Sequential access is excellent for storing groups of data for recall within the parameters of the group. Its strong points do not rest in adding data to the file or retrieving specific information groups. However, it allows a variety of data to be input with no specific format (just remember the delimiters around strings) as long as the buffer remains open.

Random access, allows a higher speed retrieval but, in order to store the information, all data must be in a specific form and printed to disk under a specified format.

Also a FIELD name cannot be reassigned any other value. For example, in our program we had a field name ST\$(PN) for one of our matrix elements. While it is acceptable in the course of the program to set another variable equal to it (V\$=ST\$(PN)), you cannot directly assign it a value (ST\$(PN)=V\$). It is permissible only to assign a FIELDed element through the use of an LSET or RSET statement. ■

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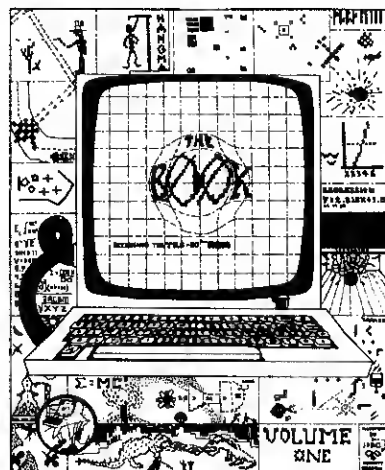
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BACK TO BASIC

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Find out how to fool your interpreter into executing your own commands.

White

Jake Commander
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This article describes how any machine code routine, a renumber or utility routine, for example, can be called by specific name from within BASIC.

Whenever the TRS-80 does something outside of BASIC, a machine code routine must be written and loaded into memory. Then, every time it's needed, it has to be called into action by using either the

SYSTEM command or the USR function.

Why can't we just give this routine a name and then, whenever we say the word, have it called, like any normally interpreted BASIC function? Because, thankfully, computers are stupid and need help from us humans before they can understand anything. The poor machine only understands what it is programmed to understand, so our new command word will go unheeded. The cleverest response we can expect is to be told that we made a syntax error.

Bending the Machine

Well, the following example will demonstrate how to make

that TRS-80 understand anything you want it to. The key lies in that syntax error. Microsoft BASIC is cleverly written to be easily expandable by providing various vectors into RAM at strategic points throughout the BASIC interpreter. One of these (and the one we can commandeer) is an error message vector. This is the vector used by Disk BASIC to print readable error messages rather than the abbreviated Level II error codes. By judicious use of this vector, we can bend that machine around our little finger!

To keep the principle of this thing clear, let's consider a trivial machine code routine to white out the screen. Once you've mastered the idea, it's just a matter of substituting your own code, and calling it by name. The name you use to call the routine must be a non-reserved word, or else the BASIC interpreter will do its own thing with it, ignorantly bypassing your efforts!

So, as we're going to white out the screen, it seems reasonable that the computer should do so after encountering the command: WHITE.

Try it. Type it in. What happens? Exactly as anticipated, we get a syntax error. So, if we

can find out what happens during the processing of a syntax error, we can use that information to our own advantage and we will!

The Error Decision

This is how things happen. Whenever the interpreter decides an error has occurred, an error code is loaded into register E and a pointer to the location of the error is saved. A few pointers are reset, and if no error recovery line is specified, an error message is printed after making a quick vector call to location 16806. This is our foot in the door.

In Level II BASIC, this vector contains a RET opcode and a shortened error message is printed. In Disk BASIC, a call is made to print an expanded error message. We can place our own routine's address at this vector and, as long as no error recovery line is specified, hey presto! We're holding the reins.

Once this has happened, we make our own syntax check and, if this is passed, execute the routine.

So, the final program is in three parts:

1) Place your own vector, pointing to part 2 of the program into RAM at location 16806, after saving the vector

```
10 DATA58,166,65,50,225,127,42,167,65,34,226,127,62,195
,50,166
20 DATA65,33,154,127,34,167,65,195,204,6,245,123,254,2,
32
25 DATA64,229,213,42,230,64,126,183,32,4,35,35
30 DATA35,35,215,6,5,17,217,127,26,190,32,39,19,35,16,2
48,241
40 DATA241,241,241,229,33,0,60,1,4,0,62,255,119,35,16,2
52,13,32
50 DATA249,175,50,154,64,225,43,215,195,30,29,87,72,73,
84,69
60 DATA209,225,241,0,0,0
70 LA=32640
80 PORX=LATOLA+99:READW:POKEX,W:NEXT
90 IFPEEK(16549)=66THENPOKE16526,LA-INT(LA/256)*256:POK
E16527
,LA/256 ELSE DEFUSR=LA
100 X=USR(0)
```

Program Listing.

0	W	H	I	T	E	:	W	H	I	T	E	0
↑												↑

Fig. 1. Two possible locations which may be pointed at by 16614.

that is already there. When altering any vector never assume you know what's there when your program is loaded. Vectors can be changed, and something you don't know about (such as this program) may change one. Hence, if we are not going to disable whatever that vector is pointing at, we must save it and hand control back to it if necessary. Ignore at your peril.

2) Check that the error which occurred was indeed a syntax error. After all it would be somewhat of an overreaction to white out the screen every time a divide-by-zero error occurs! If it is a syntax error, then check that our command caused it.

3) Assuming our command has brought us this far, we can now jump to, or execute directly, our routine and safely ignore the syntax error condition so that the BASIC interpreter can plod onwards.

The program is illustrated in assembler code, but for those of you who are not yet familiar with machine code, a BASIC program is shown which will POKE the routine into memory and initialize it.

The Program

The first part of the program, as already explained, picks up the vector from 16806 to 16808 and saves it at the end of the routine. After this vector is saved, we place our own jump address there, thus receiving a call to part 2 of the program every time an error occurs in BASIC which is not trapped by an 'ON ERROR GOTO' statement. Once the vectors are set up, we jump back to a READY condition so that normal BASIC may continue.

The second part of the program performs our own check in the event of a BASIC error. We know that a syntax error will occur when the command

WHITE is encountered, so we check for this by looking at the error code in the E register. If it is not a two, then it's not a syntax error, so we exit via the saved vector at the end of the program.

If it is a two, then we need to check that the syntax error is caused by our command.

We need to know one more thing at this point—the location of the text which caused the error. This is thoughtfully stored for us in location 16614 by the normal error routine, so we load this pointer to the HL register.

Now, this pointer doesn't point exactly at the statement causing the error, but at one byte past the end of the preceding statements. We need to bump this pointer to point at the offender's statement.

One last possible complication here is that if the preceding statement is at the end of a line, location 16614 points at the line terminator byte of zero. So we merely test for a zero byte and, if necessary, bump HL over the next-line pointer (2 bytes) and the line number (2 bytes). Fig. 1 should make this clearer.

Word Match

At this point, HL is pointing directly at the statement and we are able to make a byte by byte comparison with our command to check for a word match. If the comparison fails then, as before, we exit via our saved error vector (after restoring registers), otherwise we drop through to our routine and execute it.

This comparison check can easily be changed to a table search so that we can accommodate as many commands as we need. So, at last, that clever computer understands and does as it is told. We only need to do a little cleaning up and return to BASIC.

We stored three registers on

the stack, so we can remove these as they are no longer needed. Also, the original vector call has placed a return address on the stack, so we pop this off and the stack pointer looks rosy.

One last thing: Remove the

syntax error code which the BASIC error routine has stored at location 16538. This is the location which, after a syntax error, causes an automatic entry into the EDIT mode, and this we don't need.

Now we can hand control back to BASIC to see if there are any more BASIC commands to be continued. HL is bumped to the next statement using a RST 16 opcode and we make a final jump to 7454, thus BASIC is back in control... until the next syntax error. ■

```

00010 ;*****
00020 ; "WHITE"
00030 ; BASIC WHITE-OUT CMND
00040 ;*****
00050 ORG 7F80H ;TOP OF 16K
00054 ;*****
00055 ;PART ONE *****
00056 ;
00060 SETUP LD A,(16806) ;#
00070 LD (OUT2),A ;# OLD VECTOR
00080 LD HL,(16807) ;# TO PROG END
00090 LD (OUT2+1),HL ;#
00100 LD A,195 ;#
00110 LD (16806),A ;# NEW VECTOR
00120 LD HL,ENTRY ;# INTO POSITION
00130 LD (16807),HL ;#
00140 JP 1740 ;"READY"
00144 ;
00145 ;*****
00146 ;PART TWO *****
00150 ENTRY PUSH AF ;SAVE AF REC
00160 LD A,E ;ERROR CODE
00170 CP 2 ;SYNTAX ERROR?
00180 JR NZ,OUT1 ;IGNORE IF NOT
00190 PUSH HL ;SAVE
00200 PUSH DE ;REGS
00210 LD HL,(16614) ;LOC OF ERROR
00220 LD A,(HL)
00230 OR A ;TEST FOR ZERO
00240 JR NZ,NCHR
00250 INC HL ;# BUMP PAST
00260 INC HL ;# NEXT-LINE POINTER
00270 INC HL ;# BUMP PAST
00280 INC HL ;# LINE NUMBER
00290 NCHR RST 16 ;GET NEXT CHR
00300 LD B,5 ;COMMAND CHR COUNT
00310 LD DE,CMD ;POINTER TO COMMAND
00320 CMPR LD A,(DE) ;) CHR BY CHR
00330 CP (HL) ;) COMPARE
00340 JR NZ,OUT0 ;)
00350 INC DE ;)
00360 INC HL ;)
00370 DJNZ CMPR ;)
00380 POP AF ;DUMMY POPS
00390 POP AF ;TO RECTIFY
00400 POP AF ;STACK POINTER
00410 POP AF ;
00420 PUSH HL ;SAVE POINTER TO TEXT
00430 ;
00431 ;*****
00432 ;PART THREE *****
00440 LD HL,15360 ;SCREEN ADDRESS
00450 LD BC,4
00460 LD A,0FFH ;WHITE GRAPHIC
00470 WHT LD (HL),A
00480 INC HL ;BUMP SCREEN ADDRESS
00490 DJNZ WHT
00500 DEC C
00510 JR NZ,WHT
00520 XOR A
00530 LD (16538),A ;REMOVE ERROR
00540 POP HL ;RESTORE TEXT POINTER
00550 DEC HL
00560 RST 16 ;GET NEXT CHR
00570 JP 7454 ;DO NEXT STATEMENT
00580 CMD DEFM 'WHITE'
00590 OUT0 POP DE ;RESTORE
00600 POP HL ;ALL
00610 OUT1 POP AF ;REGISTERS
00620 OUT2 DEFS 3 ;SAVED VECTOR
00630 END SETUP

```

Assembly Code for White Command.

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 - overtime pay

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- ★ invoice information recorded; invoice #, description, buyer, check register #, invoice date, age date, amount of invoice, discount (in %), freight, tax (\$), total payable
- ★ transaction print and file maintenance procedures insure accuracy
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- ★ fully linked to GENERAL LEDGER; each invoice can be distributed to as many as five (5) different GL accounts; system automatically posts to cash and A/P accounts

CAPABILITIES

- ★ menu driven; easy to use; full screen prompting and cursor control
- ★ invoice oriented; invoices can be entered before ready for billing, when ready for billing, after billing or after paid
- ★ allows entry of new invoice, credit memo, debit memo, or change/delete invoice
- ★ allows for progress payment
- ★ transaction information includes:
 - type of A/R transaction
 - customer P.O. #
 - description of P.O.
 - billing date
 - general ledger account number
 - invoice amount
 - shipping/transportation charges
 - tax charges
 - payment
 - progress payment information
 - transaction print and file maintenance procedures insure accuracy
- ★ customer statements printed; computer statements with your company letterhead can be purchased from SBSG
- ★ reports include; (samples on back)
 - listing of invoices not yet billed
 - open items (unpaid invoices)
 - closed items (paid invoices)
 - aging
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(Continued on next page)

(PAYROLL CAPABILITIES CONTINUED)

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- ★ paychecks are printed; computer checks with your company letterhead can be purchased from SBSG
- ★ calculations are accumulated for; employee pay history, 941A report, W-2 report, insurance report, absentee report
- ★ fully linked to General Ledger. Each employee's payroll information can be distributed to as many as (12) twelve different GL accounts; system automatically posts to cash account.

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**Morse Code
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Robert M. Richardson
Drawer 1065
Chautauqua Lake, NY 14722

Here is a program that will both transmit and receive Morse code on your Level II TRS-80 and on most microcomputers with 8K or more of Micro-soft BASIC. Morse Code Transmit and Receive, written for Level II, allows code speeds of up to 25 words per minute, yet the average user can follow the program logic.

The Morse Code Transmit and Receive program is in three parts. The main program, Part III includes an instruction summary. This article will not duplicate the detailed instructions included in Parts I and II, but is provided for those users who wish to dig deeper into this BASIC program's logic, flow and layout.

How It Works

The program works without any peripheral devices whatsoever. The cassette motor control relay, K1, is used for the keying relay. The cassette EAR plug line is used for receiving Morse code audio of approximately one volt peak to peak derived from the station receiver's speaker terminals.

A unique software solution renders the TRS-80 flip-flop Z-24 invisible to in-coming signals. Since K1 will only handle very low power levels (about six volts at 400-500 mls) it is strongly recommended that a 7406/7507 TTL buffer chip or Radio Shack #275-004 (\$2.99) relay be used as a buffer between the TRS-80 and the station transmitter.

The first, or initialization segment, allows you to choose either alphanumeric or Morse code readouts on the video and to choose the Morse code transmit speed (receive speed is automatic). It also reminds the operator that ← calls up the instruction summary and that the CLEAR key is the transmit/receive switch. It defines A to Z as integers for optimum code speed, DIMENSIONS the Morse receive array and CLEARs 2550 bytes for the automatic log-book/file. Lastly, it includes an error trapping function that can be used to obtain immediate return to the TRANSMIT mode.

Transmit Morse Look-up Table

Surprisingly, the fastest means of generating Morse code in 12K without machine code is the simple IF-THEN statement and look-up table. This converts the alpha-numeric/punctuation symbol to its equivalent Morse code character. All 1's = dots and all 2's = dashes, i.e., A = 12, B = 2111, C = 2121.

Each character is followed by GOTO, which directs the program to the transmit Morse timing segment. Though Version 2.2's transmit Morse look-up table is given alphabetically and numerically for convenience, it can be further speeded up by rearranging the alphanumerics in the same order as the DATA table in the RECEIVE Morse decoding segment.

The RECEIVE mode order approximates the most commonly used letters in the English language. For instance, E is the most commonly used letter, so it = a dit (1), and O the most infrequently used letter, so it = dah dah di dah (2212).

If one were to transpose the 1's to 0's and the 2's to 1's you would have binary numbers equal to the most frequently used alphabet characters in English. Give you any ideas?

In the TRANSMIT mode all generally accepted Morse characters are provided plus

EOM (end of message) and EOW (end of work) by using the # and & symbols, respectively. Should a keyboard character, such as \$ or % or @, which has no Morse equivalent, be entered, an error-trapping subroutine skips it.

At the end of the look-up table, the ASCII codes for ↑, ↓, → and CLEAR are scanned. The program is directed to the sub-routines of Q signal-message, auto-logbook, instruction summary, log book review or RECEIVE mode, as you wish.

The Transmit Morse Timing segment translates the Morse 1's and 2's into properly timed dots and dashes. The correct timing intervals are spaced between each element and character via the LEN and MID string functions. This allows the program to peel off each element of a character, one at a time.

The international standard (dot = 1 time interval, dash = three times 1 dot interval and a space between dot/dash elements = 1 dot interval) is set by this segment.

Transmitting code speed is determined by multiplying each element that forms a Morse character by S, the adjusted speed value that you input at the beginning of the program. Finally, this segment directs the program back to the keyboard, Q signal/message subroutine or proper code practice segment.

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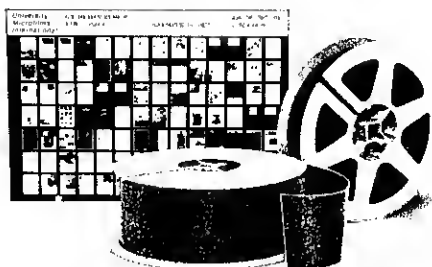


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K1, a tubular yellow capsule on the bottom left side of the lower TRS-80 printed circuit board, the cassette motor control relay, is closed and opened as the keying relay via the OUT (port) 255 statement.

If you are skilled in printed circuit board work, you could install a normally closed mini-phone jack on the rear of the TRS-80 keyboard. This must be done in series, between relay K1 and the output of integrated circuit Z-41 to drive a separate relay such as the Radio Shack #275-004 for transmitter keying. This relay can handle 125 volts ac at 1 amp and is fast enough to follow the program up to about 25 words per minute.

Conversely, a high speed 5 to 6 volts dc reed relay can be used which follows this program up to about 40 words per minute. Above this speed, program execution time in BASIC becomes the limiting factor. By utilizing the excellent Mumford Micro Systems 3-speed TRS-80 clock modification, both TRANSMIT and RECEIVE modes can be increased an additional 50 percent.

Q Signal-prepared Message Segment

Twenty prepared Q signal and message formats are given including: CQ, QTH, QRZ, QRX, QSL, OSY, QSY +, QSY -, QRM, QRN, QRS, QRQ, RST, QSL, 73, etc. There is no limit, except available memory, to the number of additional messages you can add.

There is also a SPEED subcommand that can change the transmit code speed without reinitializing the program and losing the data stored in the automatic logbook.

This segment also allows the operator to select the type of TRANSMIT Morse code practice desired. Code 1 = alphabet only. Code 2 = alphanumerics. Code 3 = alphanumerics + punctuation. Though the arrow symbols are illustrated as reminders, they can only be used during the transmit or receive modes.

The LEN and MID string functions of Level II BASIC are used for peeling off each letter, one at

a time, for each prepared message. Each message is limited to a maximum of 255 bytes (string length), but by concatenating strings with appropriate software mods any message of any length can be transmitted.

One final noteworthy subcommand included in this segment is TEST. This function outputs the word PARIS with appropriate letter and word spacing standards so that the operator can time the number of words sent for 15 seconds, multiply by 4 and calibrate his words-per-minute code speed.

Code Practice is a unique subroutine that utilizes the random number generator to select a number between 1 and 26 in the Code 1 (alphabet only) practice mode. By adding 59 to the random number, the ASCII character code for the alphabet from

dot length for word spacing.

Receive Morse Decoding

An algorithm derived by the MIT Radio Club many years ago and improved upon by Robert Kurtz and myself, is applied here. The method I developed to interface the TRS-80 with an ordinary speaker output does not require any ancillary/peripheral devices to work properly with Morse signals of S4 or stronger.

This subroutine makes the TRS-80 flip-flop Z-4 invisible to the approximately one volt peak to peak audio Morse signal coming from the station receiver's speaker terminals. This is done by re-setting flip-flop Z-4 every time the program measures a dot, dash or element space. With a good signal to noise ratio, incoming signal (S4 or better), it will copy well sent Morse

sequencing aspect of the program, as time/speed are important.

The FILE subroutine can be called from both TRANSMIT and RECEIVE modes by pressing → on the keyboard. The subroutine automatically advances to the next unused file.

When the FILE REVIEW subroutine is called by pressing ↓ and ENTER, the program sequentially displays four files per page (16 lines maximum, if each of the four files is filled to capacity). You do not have to review all 25 file pages to return to the TRANSMIT mode, but can escape any time by pressing BREAK @ and ENTER. Here we deliberately induce an error and use the ON ERROR GOTQ function to immediately put us back in the TRANSMIT mode.

At the end of a day's operation, or end of a contest, the file data may be saved on cassette or disk using PRINT# -1, described on page 3/10 (for cassette) of the Level II manual. If you plan to use this frequently, by all means add the following lines to this program:

```
5000 PRINT#-1,BAS:PRINT#-1,BB$:PRINT#-1,BC$:PRINT#-1,BD$(etc)
```

Remember that each print statement will handle only strings that TOTAL 255 bytes. This is why the PRINT#-1, is repeated for each string we wish to CSAVE.

Though one usually does not write instructions on how to use instructions, the five-page instruction summary is provided in part 3 of the program for the new user who does not wish to pick up a written instruction manual while operating. It is called from the TRANSMIT mode by pressing ←.

Hints and Kinks

Probably the most difficult problem this Morse Code System (or any TRS-80 Morse Code Program) is quieting the RFI (radio frequency interference) generated by the TRS-80 itself.

Every little digital gate in the TRS-80, plus the nominal 10.6445 MHz crystal oscillator

A unique software solution renders the TRS-80 flip-flop Z-24 invisible to incoming signals.

A to Z is generated and output a letter at a time, in five letter code groups.

Code 2 (alphanumerics) is generated in much the same way by randomly generating a number from 1 to 47 and adding 48 to it to obtain the ASCII character code for both numbers and alphabet. Since ASCII character codes 60, 61, 62 and 64 (which equal < = > and @ respectively) have no Morse code equivalents, they are trapped and not output.

Code 3 (alphanumerics + punctuation) is generated this way also. For brevity, the Morse double dash is displayed on video as a single dash. (Purists can easily modify this.)

Also, the normal seven times dot length spacing after punctuation has been held to only three times, since it has been found in numerous Morse code training sessions that this convention speeds up the learning process. Spacing between each five letter group uses the international standard seven times

up to 20 to 25 words per minute. This is about its upper limit because of BASIC's execution time.

For operators working stations with "swing fists" (odd-ball dot/dash timing ratios), the RECEIVE mode subroutine allows the operator to change ratios by pressing P on the keyboard. This takes a bit of experimenting and experience.

For operating convenience, the FILE (automatic logbook) can be called from both the transmit and receive modes.

The File and File Review function creates a semi-automatic logbook with auto-sequencing for each entry. During initialization, the program CLEARS 2550 bytes for this subroutine, which allows only 25 bytes per entry if all 100 log entries are used. By all means CLEAR as many bytes as your installed memory will allow.

This subroutine's most useful function is during CW (Morse code) amateur radio contests, which is the reason for the auto-

and all the clock dividers, are miniature spark coil transmitters or act like them. Do not let this overwhelm you.

Since July 1, 1979 all new microcomputers have had to meet the FCC rules regarding spurious radiation levels. But, if your computer was manufactured before this time try these recipes to minimize the problem:

- Use Radio Shack #15-1106 line filters on each component's power line after cutting each power cord to minimum length.
- Separate the TRS-80 at least six feet from the station receiver.
- Run good quality, well-shielded RG8/U separately from the transmitter and receiver to your antenna.
- Your station antenna should be at least 60 feet away from the

TRS-80. Most importantly, install a T/R relay and broadband preamplifier at the antenna.

• If all else fails, turn-off your expansion interface when operating and disconnect the keyboard/interface cable at the keyboard. When the operating day is finished, CSAVE your automatic logbook before powering up the interface and printing out the logbook data.

If the receive program works with your code oscillator but "NOT" with your station receiver, you still have an R.F.I. problem.

Shielding and grounding all the TRS-80 cables helps too. ■

This article and program is from chapter 10 of the author's volume 2, *Disassembled Handbook for TRS-80*.

Program Listing

```

10 REM FN IS RESERVED FOR DISC BASIC
20 CLS:REM note 'GT' = GREATER THAN & 'LT' = LESS THAN
30 PRINTCHR$(23):PRINT:PRINT" TRS-80 MORSE CODE SYSTEM":PRINT
40 PRINT" TRANSMIT AND RECEIVE":PRINT
50 PRINT" VERSION 2.2":PRINT
60 PRINT"NO ANCILLARY DEVICES REQUIRED":PRINT
70 PRINT" BY W4UCH/2":PRINT:PRINT:PRINT
80 PRINT" . COPYRIGHT 1979"
90 PRINT"CASSETTE & DISK RIGHTS RESERVED":INPUTR:CLS
100 CLEAR2550
110 DEFINT A-Z:CLS:INPUT"ALPHANUMERICS OR MORSE ON VIDEO DISPLAY
(A/M)":AA$:CLS:INPUT"CODE SPEED 5, 10, 15, 20, 25, 30, OR 35 W.P.
.M.":S:CLS
120 IFS=35THENS=10ELSEIFS=30THENS=15ELSEIFS=25THENS=20ELSEIFS=20
THENS=30ELSEIFS=15THENS=40ELSEIFS=10THENS=80ELSEIFS=5THENS=140EL
SEGOTO10
130 PRINT@195,"REMEMBER ":CHR$(125):"-- FOR INSTRUCTION SUMMARY
IN TRANSMIT MODE":INPUTR:CLS
140 PRINT@195,"REMEMBER THE 'CLEAR' KEY IS YOUR T/R SWITCH":;INP
UTR:CLS
150 DIMA$(100)
160 ON ERROR GOTO 170
170 RESUME 180
180 PRINT"TRANSMIT MODE"
190 Z=100:M$=""
200 A$=INKEY$:IFA$=""THEN200
210 IFA$=" "ANDLEN(D$) LT 1THENPRINT" ";GOTO190
220 IFA$="A"THENM$="12":GOTO740
230 IFA$="B"THENM$="2111":GOTO740
240 IFA$="C"THENM$="2121":GOTO740
250 IFA$="D"THENM$="211":GOTO740
260 IFA$="E"THENM$="11":GOTO740
270 IFA$="F"THENM$="1121":GOTO740
280 IFA$="G"THENM$="221":GOTO740
290 IFA$="H"THENM$="1111":GOTO740
300 IFA$="I"THENM$="11":GOTO740
310 IFA$="J"THENM$="1222":GOTO740
320 IFA$="K"THENM$="212":GOTO740
330 IFA$="L"THENM$="1211":GOTO740
340 IFA$="M"THENM$="22":GOTO740
350 IFA$="N"THENM$="21":GOTO740
360 IFA$="O"THENM$="222":GOTO740
370 IFA$="P"THENM$="1221":GOTO740
380 IFA$="Q"THENM$="2212":GOTO740
390 IFA$="R"THENM$="121":GOTO740
400 IFA$="S"THENM$="111":GOTO740
410 IFA$="T"THENM$="2":GOTO740
420 IFA$="U"THENM$="112":GOTO740
430 IFA$="V"THENM$="122":GOTO740
440 IFA$="W"THENM$="1112":GOTO740
450 IFA$="X"THENM$="2112":GOTO740
460 IFA$="Y"THENM$="2122":GOTO740
470 IFA$="Z"THENM$="2211":GOTO740
480 IFA$="/"THENM$="21121":GOTO740
490 IFA$="."THENM$="121212":GOTO740
500 IFA$="?"THENM$="112111":GOTO740
510 IFA$=" "THENM$="221122":GOTO740
520 IFA$="!"THENM$="11111111":GOTO740
530 IFA$="-"THENM$="21112":GOTO740
540 IFA$="."THENM$="222111":GOTO740
550 IFA$="."THENM$="212121":GOTO740
560 IFA$="A"THENM$="12121":GOTO740:REM "ROM"
570 IFA$="E"THENM$="111212":GOTO740:REM "Eo WORK"
580 IFA$=CHR$(91)THENGOTO780
590 IFA$="O"THENM$="22222":GOTO740
600 IFA$="!"THENM$="12222":GOTO740

```

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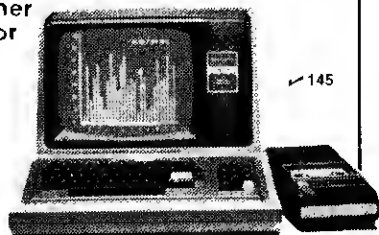
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 2710 PRINT"-THE ";CHR\$(92);" SYMBOL CALLS INPUT/FILE FUNCTION TH AT IS YOUR LOGBOOK." :PRINT
 2720 PRINT"-INPUT/FILE MAY BE CALLED FROM BOTH TRANSMIT AND RECEIVE MODES." :PRINT
 2730 PRINT"-THE ";CHR\$(94);" SYMBOL CALLS THE REVIEW FILE FUNCTION." :PRINT
 2740 PRINT"-CODE1=ALPHABET : CODE2=ALPHANUMERIC : CODE3=CODE2+PUNCTUATION." :PRINT
 2750 PRINT"-SPEED SUBCOMMAND CHANGES XMIT MORSE CODE SPEED AS DEPTED." :PRINT
 2760 PRINT"-TEST SUBCOMMAND UTILIZES INTL. STD. CODE SPEED MEASUREMENT." :PRINT
 2770 PRINT"-INSTRUCTION SUMMARY-CONTINUED." :PRINT
 2780 PRINT"-RECEIVE MODE SOFTWARE ADJUSTS SPEED AFTER 6 TO 10 CHARACTERS." :PRINT
 2790 PRINT"-YOU MAY MODIFY RECEIVE CHARACTER & WORD SPACING BY PRESSING P." :PRINT
 2800 PRINT"-TRS 80 WILL COPY ITS OWN TAPED MORSE NEAR PERFECTLY WITH LINES 2005 - CC-6 & SS-6 AND LINE 2045 B LT (.3*C) CHANGE D ACCORDINGLY." :PRINT
 2810 PRINT"-RELAY K1 ON LEFT EDGE OF Z-80 PCB IS USED FOR XMIT KEYING." :PRINT
 2820 PRINT"-IT IS NORMALLY THE CASSETTE MOTOR CONTROL RELAY 6VDC 500 MA." :PRINT
 2830 PRINT"-K1 IS UNFORTUNATELY UNRELIABLE WITH A POOR MTBF USED NORMALLY." :PRINT
 2840 PRINT"-FOR RELIABILITY CHANGE K1 TO RADIO SHACK # 275-004 \$ 2.99 EA." :PRINT
 2850 PRINT"-INSTRUCTION SUMMARY - CONTINUED." :PRINT
 2860 PRINT"-AUTOMATIC CASSETTE 'RECORD' AND 'PLAYBACK' OF INPUT-FILE DATA. OPTIONAL SOFTWARE PROGRAM IS IN INSTRUCTION MANUAL. CONCEPT IS TO CSAVE INPUT-FILE / LOGBOOK ENTRIES AT END OF OPERATING DAY." :PRINT
 2870 PRINT"-EQUIVALENT 'SPEED' TABLE - WORDS PER MINUTE: (AUTOMATIC 16K MEM VERSION AND MANUAL, SLIGHTLY SLOWER, FOR 4K MEM VERSION)." :PRINT
 2880 PRINT"-INPUT, "MP", "INPUT", "MP"
 2890 PRINT"-10" "35" "80" "10"
 2900 PRINT"-20" "25" "90" "9"
 2910 PRINT"-30" "20" "100" "8"
 2920 PRINT"-40" "15" "110" "7"
 2930 PRINT"-50" "14" "120" "6"
 2940 PRINT"-60" "12" "140" "5"
 2950 PRINT"-70" "11" "150" "4" :PRINT
 2960 PRINT"-INSTRUCTION SUMMARY - CONTD." :PRINT
 2970 PRINT"-THOUGH ARROW COMMANDS ARE LISTED IN SUBCOMMAND TABLE, THEY MAY ONLY BE CALLED IN TRANSMIT AND/OR RECEIVE OPERATING MODES." :PRINT
 2980 PRINT"-ANY NEW SYSTEM REQUIRES PRACTICE AND EXPERIENCE TO UTILIZE ITS CAPABILITIES FULLY. IT IS SUGGESTED THAT YOU GAIN EXPERIENCE WITH THE TRS-80 MORSE CODE SYSTEM USING THE RADIO SHACK MODEL."
 2990 PRINT"-# 20-005 CODE PRACTICE OSCILLATOR FOR TRS-80 INPUT AND OUTPUT, USING YOUR OWN KEY TO SEND. ADJUST VOLUME FOR ACCURATE COPY."
 3000 PRINT"-IN THE FUTURE, A CASSETTE LOGBOOK MAY BECOME A WORLD STANDARD. FOR TRS-80 OWNERS AND OPERATORS, THE 'FUTURE' IS NOW."
 3010 PRINT"-LINE 50 'CLEARS 2550' BYTES FOR THE 100 EACH AUTO-FILES. IF YOU HAVE ADEQUATE MEMORY, INCREASE THIS UP TO 25500 TO FULLY UTILIZE EACH FILE'S CAPABILITY OF 255 BYTES CAPACITY." :PRINT
 3020 PRINT"-TO ESCAPE FROM: SUBCOMMAND, FILE, FILE-REVIEW, OR INSTRUCTION SUMMARY, PRESS 'BREAK', THEN '@', AND THEN 'ENTER' F OR NEAR IMMEDIATE RETURN TO THE 'TRANSMIT-MODE' :PRINT
 3030 PRINT"-PROGRAM SUGGESTIONS AND IMPROVEMENTS ARE ALWAYS WELCOME." :PRINT
 3040 PRINT"-PLEASE SEND TO:" :PRINT
 3050 PRINT"-RICHCRAFT ENGINEERING
 3060 PRINT"-DRAWER 1065"
 3070 PRINT"-CHAUNTAQUA, N.Y. 14722
 3080 PRINT:PRINT:PRINT "ENTER" WILL RETURN TO TRANSMIT MODE :PRINT
 3090 END

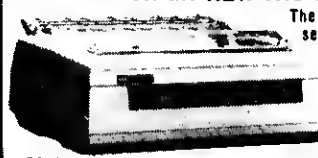
Instruction Summary

GENERAL:
 -"CONGRATULATIONS": YOU NOW HAVE THE FINEST TRS-80 MORSE SYSTEM PROGRAM THAT REQUIRES NO ANCILLARY EXPENSIVE INTERFACES.
 -IT OPERATES SIMPLY FROM THE CASSETTE INPUT AND OUTPUT PORTS, THUS REQUIRING ONLY A TRANSMITTER/RECEIVER OR CODE PRACTICE KEYER/OSCILLATOR FOR OPERATION.
 -FOR RECEIVE OPERATION ONLY A JACK IN PARALLEL WITH RECEIVER SPEAKER OUTPUT IS REQUIRED WHICH CONNECTS TO CASSETTE EARPHONE PLUG. JACK IS RADIO SHACK # 274-251 SET OF 3 FOR \$.99 PER PAK.
 -FOR TRANSMIT MODE, THIS PROGRAM UTILIZES THE TRS-80 CASSETTE MOTOR ON-OFF CONTROL RELAY AS A KEYING RELAY. RECOMMENDED MAX. IS 6VDC AT 500 MA. OR BETTER YET USE R/S # 275-004 RELAY. PRICE \$ 2.99 EACH.
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 -THE TRS-80 CASSETTE MOTOR CONTROL PLUG MATES WITH SUBMINIATURE JACK, RADIO SHACK # 275-004 AT \$.99 FOR 2 EACH. AS MENTIONED ON THE 1ST PAGE, WE STRONGLY RECOMMEND YOU USE A BUFFER RELAY OR TTL CHIP
 -TO PROTECT RELAY K1, WHOSE CONTACTS ARE UNRELIABLE AT BEST! SEE INSTRUCTIONS FOR THIS SIMPLE AND INEXPENSIVE INSURANCE.
 -THERE ARE FOUR COMMONLY USED METHODS OF SENDING AND RECEIVING MORSE CODE. THE FIRST, INVENTED BY SAMUEL MORSE OVER 100 YEARS AGO USING A KEY & SOUNDER IS STILL IN USE TODAY BUT VIA RADIO.
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for the TRS-80 Model II* Computer

The Electric Pencil is a Character Oriented Word Processing System. This means that text is entered as a continuous string of characters and is manipulated as such. This allows the user enormous freedom and ease in the movement and handling of text. Since lines are not delineated, any number of characters, words, lines or paragraphs may be inserted or deleted anywhere in the text. The entirety of the text shifts and opens up or closes as needed in full view of the user. Carriage returns as well as word hyphenation are not required since each line of text is formatted automatically.

As text is typed and the end of a screen line is reached, a partially completed word is shifted to the beginning of the following line. Whenever text is inserted or deleted, existing text is pushed down or pulled up in a wrap around fashion. Everything appears on the video display screen as it occurs thereby eliminating any guesswork. Text may be reviewed at will by variable speed or page-at-a-time scrolling both in the forward and reverse directions. By using the search or the search and replace function, any string of characters may be located and/or replaced with any other string of characters as desired. Specific sets of characters within encoded strings may also be located.

When text is printed, The Electric Pencil automatically inserts carriage returns where they are needed. Numerous combinations of Line Length, Page Length, Character Spacing, Line Spacing and Page Spacing allow for any form to be handled. Right justification gives right-hand margins that are even. Pages may be numbered as well as titled.

the electric pencil

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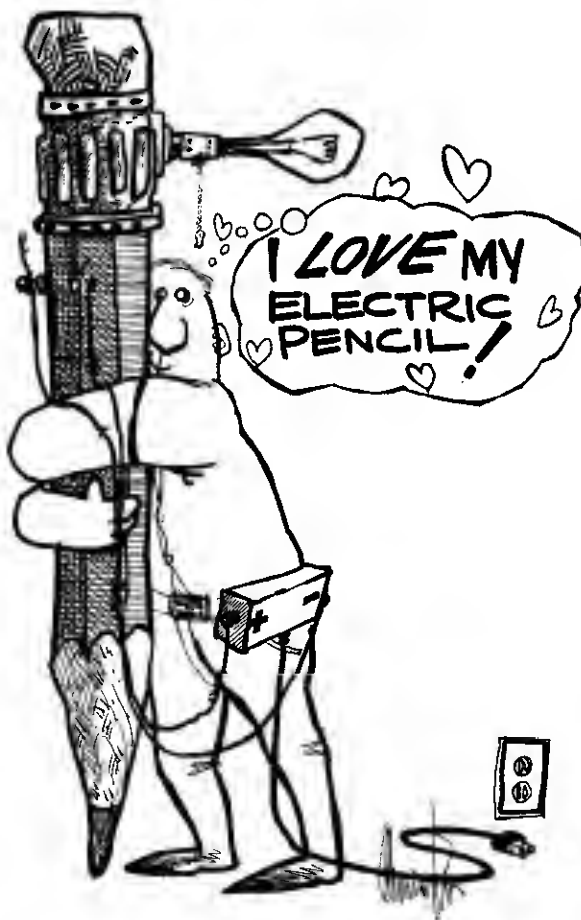
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The Electric Pencil I is still available for TRS-80 Model I users. Although not as sophisticated as Electric Pencil II, it is still an extremely easy to use and powerful word processing system. The software has been designed to be used with both Level I (16K system) and Level II models of the TRS-80. Two versions, one for use with cassette, and one for use with disk, are available on cassette. The TRS-80 disk version is easily transferred to disk and is fully interactive with the READ, WRITE, DIR, and KILL routines of TRSDOS.

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Much is left unsaid by Radio Shack's Level II manual. By trial and error and studying the programs of others, one can learn how to arrange input on the screen, so that a great deal of information can be displayed at one time in a visually pleasing format. To do this admittedly takes more time than a simple PRINT command, but the results are well worth the effort.

Before you begin any screen format, I recommend using programming paper to help you avoid awkward word divisions.

Try a Screen Chart

A screen chart for input is a desirable programming tool. To create one, input locations must be controlled. I prefer to locate input at line 768 in most cases. (Avoid the bottom line, as scrolling will occur.) To position the cursor, simply type:

```
PRINT @ 768,"";
```

The "" means null string. In other words, PRINT @ 768, nothing. The trailing semi-colon leaves the cursor there, and the input can then be placed exactly where you want it.

It might seem ridiculous to allow four lines for input

(768,832,896,960), but this is necessary if any errors are anticipated. If the user types a letter when numeric input is expected, the computer prints "REDO" on the next line (832) and a question mark on line 896 for the corrected input.

After the data is entered, it must be moved to its proper place in the chart. If the chart title is to be on the first line (0) and column headings on the second line (64), the data can be printed, starting on line 128. This is handled with a FOR-NEXT loop and an array.

Since each line is 64 spaces, multiply 64 times a variable (B). This variable is incremented by one each time through the loop. Add to this the number of the line above where you wish to start (in this case 64):

```
15 B=1
20 FOR N=1 TO 60: PRINT@768,"YOUR
  ANSWER IS ";
25 INPUT A(N)
30 PRINT@B*64+64,N;A(N);: B=B+1:
  NEXT N
```

Notice that B is set at 1 outside the loop, while it is incremented inside the loop.

To keep everything neat, the input line and answer should be erased each time through the loop. If this is not done, the previous answer still shows at the bottom of the screen when the user is ready to type in a new answer. To fix this, type:

```
PRINT@768,CHR$(30);"YOUR ANSWER IS
";:INPUT A(N);
```

CHR\$(30) erases the line, then

the question is reprinted.

A trailing semi-colon is usually used in these PRINT @ statements, and this is a good habit. You are placing the cursor all over the screen at your command, but, at the same time, the semi-colon protects data from unplanned deletions.

With this program, the screen fills after ten answers. The program can, however, be expanded to start a new column:

```
35 IF B>10 PRINT@(B-10)*64+96,N;A(N);
```

This starts a new column in the middle of the screen (64 + 32 = 96).

Improving Appearance

Separating N from A(N) improves the appearance of the chart. You might use a blank space between quote marks (N;" ";A(N);), however, this causes some problems. In the first column, when N=10, the extra digit makes the A(N) column off line. There are several solutions. One is to use tab, thus:

```
30 PRINT@B*64+64,N;TAB(5);A(N);
```

Alternatively, you could omit the tab and use a comma instead of a semi-colon after N, thereby spacing A(N) to the next column. This works, if you aren't planning many columns on the screen.

Perhaps the best solution is a PRINT USING statement. Because we are dealing with only numeric input, all we require is P\$="## ##". Place this line

near the beginning of the program. The "#" indicates where a number is to go, and the columns are neatly justified on the right side. When ready to use it, simply type:

```
30 PRINT@B*64+64,USING P$;N;A(N);
```

Note the punctuation and the fact that you type only USING, because print has already been stated before the @. If you had input a string instead of numbers, the print using string would be P\$="## % %". The % sign indicates the beginning and end of the string input.

If there are more than 20 answers in the program, you again run out of room, so an additional line is needed to clear the screen and start a new chart:

```
40 IF B=20,PRINT@768,CHR$(30);"PRESS
  ENTER TO CONTINUE TO NEXT PAGE";
  :INPUT AS:GOSUB 1000:B=0
```

GOSUB 1000 gives the chart headings. B must be reset so that the PRINT @ lines that format the screen still work. It must be set at 0, because the B=B+1 line is further along in the loop and will be encountered before the next input.

One more point deserves consideration. You must stop the input when you are finished. You could enter a value that would never occur logically, such as 99 in a program counting the daily output from 50 chickens in our sample listing. A line must instruct you to enter a number, or word, if you are entering string values, to end the program. This

can go on line 960 or at the top of the screen. Further, you need a line within the FOR-NEXT loop looking for 99:

```
25 IF A(N)=99 GOTO 55
```

The Sample Listing shows the final version of our egg production program. Of course, it must be expanded to manipulate or record data. Several more columns could be added, if desired, using the same format.

Using INKEY\$

If all the values you planned to enter were one digit, the INKEY\$ function could be used. This saves you the trouble of pushing enter. Furthermore, IN-

KEY\$ does not cause scrolling, even if placed on the bottom line.

You would, however, need an error-correcting routine, since the user does not have time to change his entry if he hits the wrong key. To use INKEY\$ for the sample program, make the following changes:

```
25 AS=INKEY$:IF AS="" GOTO 25
27 IF AS=CHRS(47) GOTO 55
28 A(N)=VAL(AS)
1010 PRINT @960, "HIT / TO QUIT";
```

Since '99' cannot be entered to stop the program, being 2 digits, the / key is used, CHRS(47). INPUT A was also changed to a string for INKEY\$, so that a null condition could be

searched. However, before A(N) is printed, it is changed back to a number in line 28 and assigned a position in the array.

Using the above statements, you can pack a lot of informa-

tion on the screen. Of course, many other commands are useful, but these few keep the cursor under your control, and your programs look more professional. ■

```
10 DIMA(60)
12 PS="###"
15 B=1:GOSUB1000
20 FORN=1 TO 60: PRINT @ 768,CHRS(30);"NUMBER OF EGGS DAY":IN:
25 INPUT A(N): IF A(N)=99 GOTO 55
30 IF B<=10 PRINT @ B*64+64,USING PS;A(N):
35 IF B>10 PRINT @ (B-10)*64+96,USING PS;A(N):
40 IF B=20PRINT @768,CHRS(30);"HIT ENTER FOR NEXT PAGE":INPUT AS:
GOSUB1000:B=B+1
45 B=B+1
50 NEXT N
55 END
1000 CLS:PRINT @200;"EGG PRODUCTION"
1005 PRINT @64,"DAY EGGS":PRINT @96,"DAY EGGS":
1010 PRINT @960,"ENTER / TO QUIT":
1015 RETURN
```

Sample Listing.

TRS-80* DISK SYSTEM SUBROUTINES

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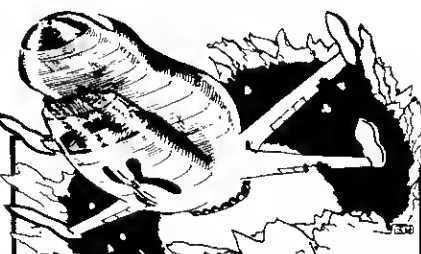
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My TRS-80 and myself had come through some rough times but together we were working them out—at least I thought we were. Looking back now, I think the real problems began when I brought home the Percom TFD-200—a 77-track disk drive that provided over twice the storage of a Radio Shack drive. The same storage capacity as two Radio Shack drives for \$675 just seemed like a smart move.

The first problem was that the Radio Shack disk cable wasn't long enough for the way the Percom drive hooks up. It cost me 40 bucks for a new one from Percom. Then my TRS-80 had to be "brainwashed," as Percom refers to "patching the operating system" to format and backup a 77-track drive.

Departing the Radio Shack Family

Next, I lost the Radio Shack printer that was nicely compatible with my 80. Its owner, the person for whom I'd been developing software, needed it back. I went shopping for another printer, but \$1600 seemed like a

steep price to pay for a noisy, relatively slow Radio Shack product. Since I was very satisfied with that first venture outside the Radio Shack family, I decided to try a Microtek printer. At \$750 it promised to be fast, versatile and quiet.

It was late October when I or-

gram. The program, an inventory system for furniture stores, was supposed to access disk, print out some information, then go back to disk again. For some reason though it didn't work properly.

My TRS-80 reset to DOS, locked up, showed syntax errors—

had killed the TFD-200.

The Post-mortem

Removing the injured disk drive from the system, I plugged everything in and powered up. Nothing. Next, I took off the two Radio Shack drives and tried again. Nothing. I unhooked the printer—nothing. The expansion interface was removed—nothing!

I got out my voltmeter and examined the equipment piece by piece. The TFD-200 was flet. When I picked it up to remove the screws holding its cover. I heard it rattle. While removing the cover, several pieces of black plastic fell out—pieces of integrated circuits! Looking at the PC board, I could see that several chips had exploded and there were several black marks where whole PC traces had vaporized.

I looked inside the two Radio Shack disk drives, and, while they showed no visible signs of damage, a voltage check on each of them showed 0.56 volts where 5 volts should have been. The expansion interface and keyboard showed similar low voltages. Finally, I measured the printer power supply. It wasn't much better at 0.85 volts.

I could not imagine what had happened.

The printer was the only thing

**"Crack! I looked up to see
smoke pouring from the TFD-200
cabinet . . . CRACK! More smoke."**

dered the Microtek printer and delivery was quoted as late November. Three weeks without a printer to save \$850 was a good trade-off for anyone in my tax bracket.

But Microtek didn't deliver on time. They were back-ordered and their printer mechanism supplier was behind on his shipments.

Finally, in late December, the printer arrived. I hooked it up, using a standard Centronics type cable from Radio Shack. It was time for a trial run. First, I loaded a program listing into memory, pressed LLIST and out came a neat, easy to read listing at 125 characters per second.

Next, I tried running a pro-

gram. The program, an inventory system for furniture stores, was supposed to access disk, print out some information, then go back to disk again. For some reason though it didn't work properly.

A moment later, I reached to pick up a pencil that I had hurled onto the floor in frustration, and my foot caught the power cable to the Percom TFD-100 knocking it halfway out of the wall socket.

Crack! I looked up to see smoke pouring from the TFD-200 cabinet. When I saw the TFD-200 cord partially unplugged, I—in what has to be in contention for the dumbest move of the year—plugged it back in. CRACK! More smoke. I quickly unplugged everything.

I was certain this was the 80's work. In retaliation for the foreign equipment I had bought, it

that was new. It had to be related to the disaster. I began reading the Microtek manual searching for a clue. (I hadn't bothered reading it before.) The interfacing section contained some interesting facts. It seems that Microtek uses a chassis ground separate from the logic signal ground. Microtek further suggest that these two be kept separate.

I got out the TRS-80 expansion interface service manual and sure enough, the chassis ground (pin 17 of the Microtek printer connector) was connected to signal ground inside the expansion interface. Things were starting to make sense.

Looking at the TFD-200, I realized it and the Microtek printer had 3-prong power plugs. The Radio Shack equipment had no ground pins on their power plugs. Ground pins are longer than the two power pins on AC cords. When I kicked the TFD-200 power cord, only that longer ground pin stayed in its socket.

Somewhat a ground loop was

created, when I kicked out the plug, causing 120 volts (or some fraction thereof) to get onto the signal ground. This theory was borne out by examination of the Microtek PC board. The trace going to pin 17 (chassis ground) was vaporized.

Realizing how grave the injuries were, I decided to consult the experts. With notes of explanation I returned the printer and TFD-200 to their manufacturers for repair. I took the expansion interface and Radio Shack drives to the computer center for treatment.

I kept the keyboard at home to repair myself. Thirteen chips, \$21 and 16 hours later, the TRS-80 had recovered. The expansion interface repair bill was \$72. The Radio Shack disk drives cost \$45 each. The Microtek printer repairs were \$168.52. The Percom drive is not back yet, but will cost around \$90-\$110.

I was without a computer for 4 weeks. Worse, the repaired Microtek printer does not function

as it should. It gets lost while printing and prints only partial lines or forgets to do line feeds. According to Microtek, even some of their new printers do it, but they have no cure for it at present. I am returning the printer for a refund.

Saving Money

For me then, the high cost of saving money was about \$485 counting shipping charges, the loss of a system for over a month, and I still don't have a printer.

I'm not saying that foreign equipment on a TRS-80 isn't a good idea. Nor am I saying that there is anyone to blame but myself for my tragedy. I do suggest though that anyone using computer equipment give consideration to these points:

1. Make certain your AC power is wired properly. I don't just mean a properly wired 3-prong outlet either. If you're like most people, you never have enough places to plug things in. I used

an extension cable with a faulty ground—and I paid for it.

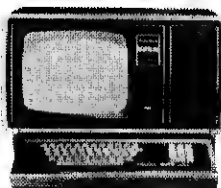
2. When hooking one manufacturer's piece of equipment to another's, pay close attention to detail. Phrases like "Centronics compatible" don't necessarily mean complete compatibility. Read the manual carefully to be sure.

3. Don't move equipment around while it is still turned on. Turn off everything before unplugging a single component.

4. If you do make a mistake—don't hide it. Write about it. Others can learn from what you did wrong, and you can recoup a few bucks to boot.

5. If you're in a hurry to get a job done, don't try something brand new. Computer equipment is complex and manufacturers are under economic pressure to get equipment out into the field. I lost a lot of valuable time trying to get Microtek's printer to work. Let someone else be the guinea pig. Remember, advertising claims are almost always optimistic. ■

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As an owner of a TRS-80, I wanted to get full use out of the machine by using data files and other programs that required repeated on-off control of the recorder by the computer. I

was concerned, however, for I had heard several complaints by others that the relay that did this had become mini-welded in the closed position. When this happens, you can either forget about that feature of the TRS-80 or send it in to be repaired, which means downtime and repair costs. Neither prospect appealed to me. After witnessing a friend's computer undergo this tragic transformation, I decided some preventative sur-

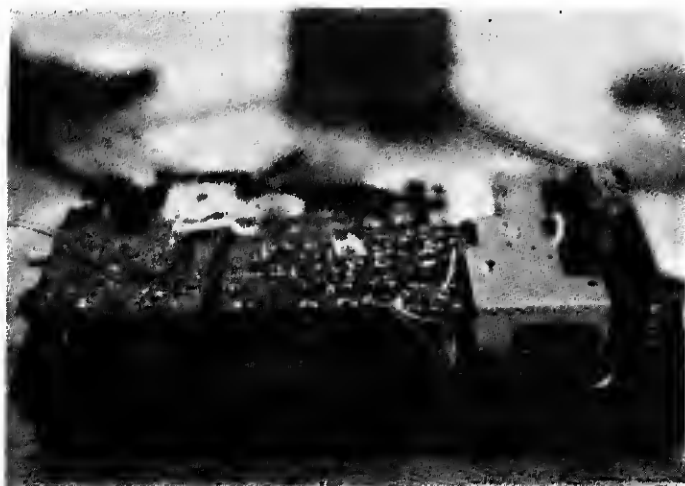
gery was needed to correct the design flaw.

The solution is quite simple: Reduce the amount of current being switched by the relay so that arcing will not occur. You can purchase a device to do this that costs from \$10 to \$25, but this adds to the entanglement of cords and is unnecessarily expensive. I found that a 3055 NPN transistor mounted inside the tape recorder is the best solution. The transistor acts as

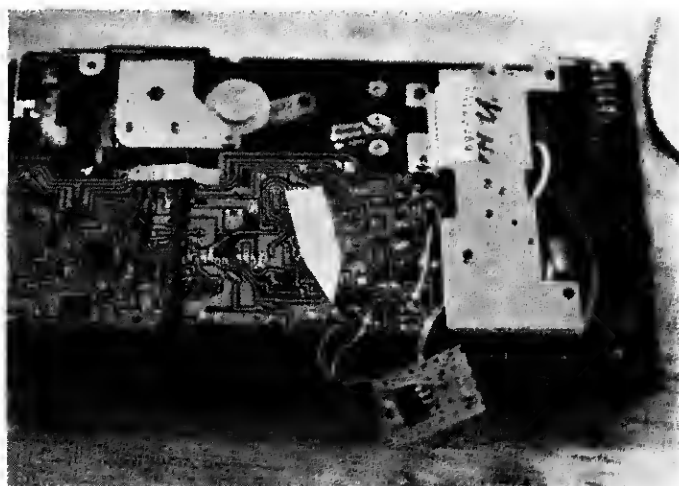
a switch. Its base is turned on by the computer's relay. The current across that relay is reduced from 100 mA to .5 mA. (See Fig. 1.)

I mounted the 3055 (TO-220 case) and the resistor on a small piece of perfboard, wrapped it with tape and slipped it into a nice bit of unused space in the recorder. It could also be built in a small case and set beside the recorder.

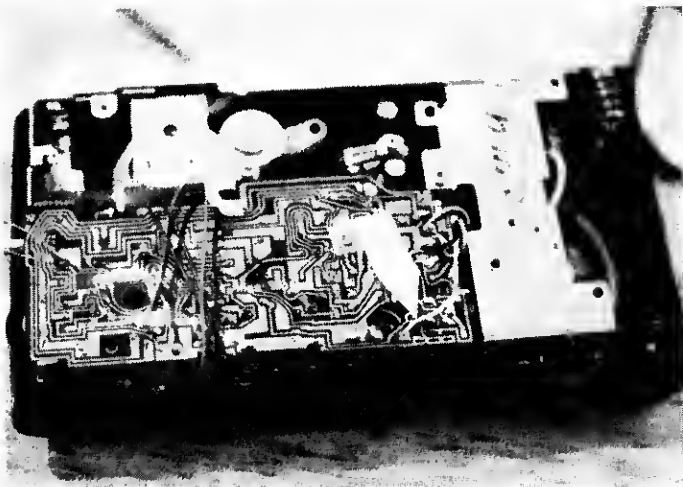
For internal construction, the



Perfboard with circuit tucked in just in front of battery holder.



Position of connection from collector to recorder.



Negative power supply wire, which is desoldered at this point

negative wire of the recorder's power supply needs to go directly to the circuit. The wire from the transistor's base is then soldered to the spot you unsoldered the negative wire from. The wire from the collector goes to the other side of the plug receptacle, which is conveniently located (on the Radio

Shack recorder) a few millimeters from the connections previously made.

That's all there is to it. After a few minutes of soldering and some careful positioning, you'll never again have to worry about getting hung up in the middle of a program—well, at least not by a relay. ■

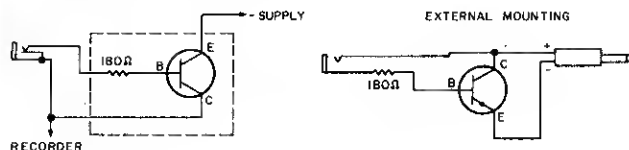


Fig. 1.

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After using a microcomputer for only a short time, it became apparent that some type of hard copy device would be a great help, especially in debugging programs.

After looking at various printers, both serial and parallel, the Heathkit H14 line printer at \$625.00 looked like a good buy. The H14 prints upper and lower-case letters with 80, 96 or 132 characters per line. Vertical line spacing is 6 or 8 lines per inch and all of these parameters are controlled by software.

The H14

In addition, 80 or 132 character lines can be selected by a front panel switch. The baud rate is adjustable between 110 and 4800 and is easily set with three DIP switches. Unless handshaking is established, 110 baud is recommended. The H14 uses 9½-inch paper with sprocket holes on both sides.

The perforated edges are easily removed to yield an 8½ by 11 page.

After acquiring the Heath printer, I tried to interface it, using the RS232 sold by Radio Shack. Both the printer cable and the RS232 cable from the computer have male plugs, so I mounted two female DB25 connectors on a small box, wired them together and connected the two pieces of equipment.

The printer worked well at low baud rates, but printed only part of the text at higher ones.

Handshaking between the printer and the computer did not occur. Request To Send (pin 4 on the DB25 connector) on the Heath printer goes high when the buffer in the printer is full. The computer is supposed to wait until Request To Send goes low before sending more data.

Request To Send from the computer RS232 is also on pin 4 of the DB25 connector, but it is an output. To provide handshaking it would have to be an input.

According to the RS232 manual, the Clear To Send input (pin 5 on the DB25) is unused. Request To Send from the printer (pin 4) was wired to pin 5 on the female socket, used by the RS232 cable from the computer.

The signal on pin 5 of the printer is also unused.

Software

I altered the Radio Shack driver program, supplied with the RS232, in order to establish handshaking. I inserted the patch seen in Example 1 in the driver software between lines 510 and 520 of the source program.

With these changes the Heath printer operates at 4800 baud without losing any text. There is an impressive difference between 300 baud and 4800 baud.

When the machine-language driver produced by this assembly language program is loaded from disk, the entry address must be placed in the printer Device Control Block before it is used. This can be done with POKE statements from BASIC or by adding the patch in Example 2. The Device Control Block is changed automatically when the program is loaded.

If you are using TRSDOS 2.2, one last patch eliminates the need to protect the driver with the memory size routine when entering Disk BASIC (Example 3).

This feature of TRSDOS 2.2 is

mentioned in the documentation.

Interfacing with the TRS232

When a 300 baud modem is used with the RS232, changing back and forth between 300 and 4800 baud for the printer is inconvenient. For that reason I tried the Small Systems Software TRS232.

This device attaches at the cassette port and claims to be able to drive an RS232 compatible printer at baud rates up to 9600. The Electric Pencil and RSM-2 also support this device, but only to 1200 baud.

Hooking it up is very simple. Plug the tape recorder cable into the cassette port with the other end in the TRS232. Plug the printer cable into the TRS232 and plug the power supply into an outlet.

The TRS232 from Small Systems Software comes with a BASIC program. The baud rate, number of nulis to be sent after a carriage return and other specifics are fed in as the BASIC program asks for them. The program then creates a machine-language driver at the address you specify and makes the necessary entries in the printer Device Control Block.

```
512 IN      A,(RESURT) ;CHECK HEATH RTS
514 BIT     7,A        ;IF HIGH BUFFER FULL
516 JR      Z,STATIN  ;LOOP UNTIL PRINTER
518                          ;IS READY
```

Example 1.

```
30 ORG      4025H      ;START OF PRINTER DCB
40 DEFB     02H        ;TYPE I OR O
50 DEFB     XXH        ;DRIVER ADDRESS LSB
60 DEFB     XXH        ;DRIVER ADDRESS MSB
```

Example 2.

With this device the Heath printer works fine up to 1200 baud. Operating faster than this is not possible because hand-shaking has not been established, and the text is lost when the buffer becomes full.

Letters typed with the shift key held down are printed as lowercase, just as with the Radio Shack Quick Printer.

To print lowercase normally, I recommend the excellent disk version of Electric Pencil that contains a driver for the Radio Shack RS232 as well as the Small Systems TRS232.

Other software, such as KVP and DOS 3.0, also provides type-writer action with upper and lowercase, but lowercase letters will not appear on the video display unless a hardware modifi-

cation is made.

Software Compatibility

The Small Systems Software driver program is not compatible with the NEWDOS version of the EDITOR/ASSEMBLER, the NEWDOS DISASSEMBLER and several other programs. The Radio Shack RS232 and modified driver program have worked with all software I've tried, with the exception of the tape version of Electric Pencil.

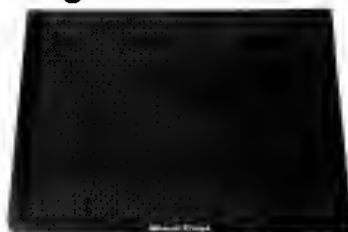
Maximum software compatibility with the Heath H14 or any other serial printer will not be achieved until a hardware solution is applied. The serial printer must be made to appear like a parallel printer. Then, the only driver program that will be needed is in the Level II ROM. ■

```
70  ORG      4049AH  ;MEMORY SIZE STORAGE
80  DEFB     XXH    ;DRIVER ADDRESS LSB
90  DEFB     XXH    ;DRIVER ADDRESS MSB
```

Example 3.

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Analog to digital conversion via the AD570 and AD582 chips.

Two Different Worlds

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possible value. Examples of continuous quantities are very easy to find around us. The temperature of the air is a continuous quantity which can take on any of an infinite number of values, although we may not be able to measure or detect all of these values.

Digital Quantities

Examples of discrete or digital quantities are also plentiful. If you are like me, you probably have at least one digital clock around the house. The time increments, whatever they are—minutes, seconds, or even tenths of a second—are discrete steps of time. Another example of a discrete quantity is the speed of a push-button blender. The blades of the blender can take on only a finite number of different speeds. When you push a different button, the

blades change to another discrete value of speed.

There are many methods that could be used to accomplish A/D conversion. The method I will discuss is called successive approximation. This is the method used in Analog Devices' A/D converter chip, the AD570. This chip contains all the circuitry needed to convert a 0 to 10 volt or -5 to +5 volt signal to an 8-bit digital value in approximately 25 microseconds.

Fig. 1 is a block diagram of the AD570 A/D converter. It will serve as a good aid to describe the operation. Upon receiving the negative edge of the CONVERT pulse, the internal 8-bit current output digital-to-analog converter (DAC) is fed binary values from the successive approximation register (SAR), starting with the most significant bit first. This produces a current

which is injected into the summing junction of the comparator. The other current input is from the input signal.

The comparator determines whether the addition of each successively weighted bit current causes the DAC current sum to be greater or less than the input current. If the sum is less, the bit is left on; if more, the bit is turned off. The decision is made by the SAR based on the input to it from the comparator.

The clock is also contained in the SAR. When the final bit is checked, the SAR contains a 8-bit binary number that represents the input signal to within $\pm 1/2$ LSB. Upon completion of this sequence, the SAR sends a DATA READY (DR) signal (active low), which also places the three-state buffers into their active states.

Since a computer is digital in nature (numbers exist inside the machine in discrete values), we must change the continuous quantity into a digital form in order to represent it inside our computers. This is called an analog-to-digital (A/D) conversion.

Many of the signals we see every day are continuous in nature. By continuous I mean a quantity which can take on any

Level II BASIC	Z-80 Machine Language	Comments
A = INP(126)	IN A,7E DB 7E	Reads binary value from converter into accumulator.
OUT 126,C	OUT 7E D3 7E	Loads analog channel number into flip-flop U6 (0-7). Channel number must be in accumulator before executing this Z-80 instruction. For BASIC, variable C must be the channel number.
OUT 127,x	OUT 7F D3 7F	Starts A/D conversion process. Contents of accumulator not important as only the pulse generated by the address decoder (U9) is used to trigger one-shot. For BASIC, x can be any integer 0 to 255.

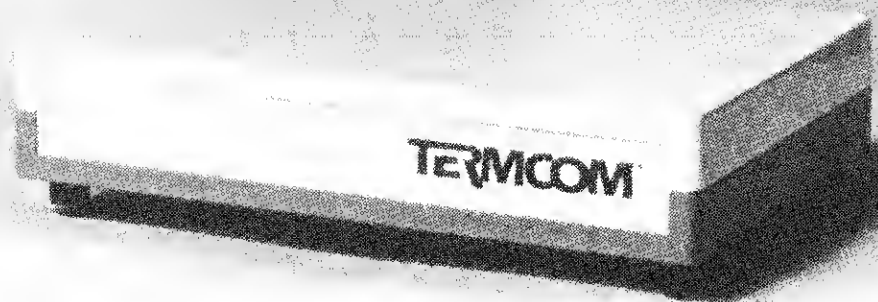
Table 1. Instructions in Z-80 machine language and Level II BASIC for addressing the A/D converter board.

Integrated Circuits and Diodes Parts List—A/D Converter

Ref. #	Type	+5V	Com	-12V +7.5V	-7.5V
U1,2,3,4	LM1458			8	4
U5	CD4051		8	16	7
U6	74LS175	16	8		
U7	7416	14	7		
U8	7430	14	7		
U9	74LS139	16	8		
U10	74123	16	8		
U11	AD570	10	16	12	
U12	74LS244	20	10		
U13	7805				
U14	LM1458			8	4
D1,D2	1N755A	7.5V	Zener	$\pm 5\%$ 400mW	

Parts List

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- **Screenlock** that allows the display to be split between locked-in data and normal use.
- And a lot of other features — like automatic protection against buffer overflow.

The Termcom software comes on either cassette or disc, and the hardware is compatible with all Radio Shack equipment, and is ready to connect to a variety of peripherals: A modem for timesharing . . . an inexpensive serial printer . . . test equipment . . . In fact, whatever your computer is used for, the Termcom is an intelligent choice.

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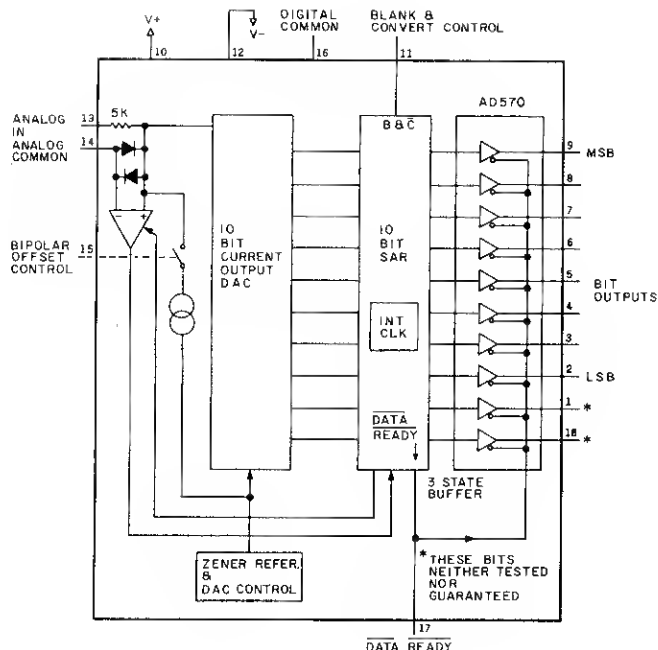


Fig. 1. The AD570.

In the simplest mode of operation, the convert pulse mode (see Fig. 2), the B & C input is normally low, enabling the three-state devices. When the B & C input goes high, it causes the three-state devices to turn off by sending (DR) high.

When the B & C input goes low, this starts the conversion process. Typically, 25 microseconds later, the DR line returns low to signal the end of the conversion. This signal also enables the three-state buffers to allow the binary number to be read. This is only one of the many configurations available to operate the AD570. The AD570 data sheet contains details of the other possible configurations.

The Design

This 18-pin DIP integrated circuit can greatly simplify the design of an eight-channel A/D converter board. The signal designations are from a TRS-80 computer system, which uses a Z-80 microprocessor. I chose to use the IN and OUT Z-80 instructions, which require only the lower eight address lines to specify the Input/Output (I/O) port number. I could have used memory-mapped I/O, but this normally requires using more than just eight address lines.

The IN and OUT signals used

in Fig. 5 are generated in the TRS-80 by combining the Z-80 signals RD and IORQ to produce IN, and WR and IORQ to produce OUT (see Fig. 3). The port numbers for this board are 7EH and 7FH.

An OUT instruction outputs the contents of the accumulator on the data bus and the port number on the lower eight address lines as above. The data on the data bus is loaded into the accumulator. See Table 1 for instructions to address the A/D board. A flow chart for writing a program to perform the conversion is given in Fig. 4.

The A/D Converter

The desired channel number is first loaded into the channel register (U6 in Fig. 5) with the appropriate instruction. This number is fed to the select inputs of a CD4051 analog multiplexer. This device can accept up to eight analog inputs and send the one specified by the select lines to the output.

The analog inputs are all buffered with op amps wired as unity gain amplifiers. These buffers provide a gain of one with a very large input impedance and a low output impedance. These are both desirable properties of a buffer. The high input impedance prevents loading of the sig-

nal source. The low output impedance allows the full signal swing to be applied to the desired point.

The output of the CD4051 is also buffered with a unity gain buffer. This output goes directly to the only adjustment on the entire board, the full scale calibration resistor.

There is a bipolar control, pin 15, which is used to select the range of allowable input to the converter. If this pin is high, the converter is in the unipolar range (0 to 10 volts full scale). A low at this pin places the converter in the bipolar range (-5 to +5 volts full scale).

On my system this pin is wired to provide the bipolar range at all times. This could be made software selectable to provide more flexibility.

When it is desired to start a conversion process, the appropriate instruction is executed. This instruction places a port number of 7FH on the lower address lines. The decoder (U8 and U9 in Fig. 5) generates a negative-going pulse that triggers a one-shot multivibrator (U10). This pulse from U10 is approximately 2.5 microseconds wide. The trailing edge of this pulse initiates the conversion process (B & C pulse in Fig. 2).

Since I do not use the DR signal to flag the processor when the conversion is complete, I

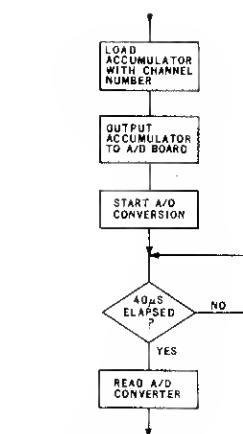


Fig. 4. Flowchart for an A/D conversion without a flag.

simply wait 40 microseconds (worst case conversion time) and then read the converter with the appropriate input instruction.

If you are using BASIC, nothing is lost because by the time the BASIC interpreter reads the next line of your program, the conversion is complete. When using machine language in a Z-80 based system, you must choose a few time-wasting instructions to execute while the conversion is taking place.

When the read instruction is executed, the decoder detects port number 7EH in conjunction with the IN line going low and enables the three-state buffer (U12), which allows the data to be placed on the data bus. The

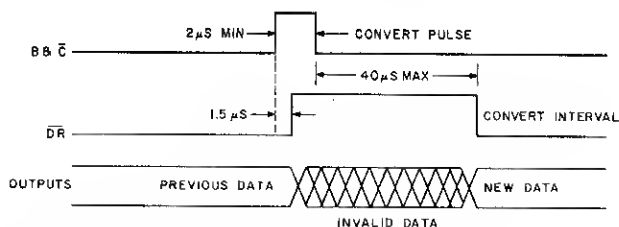
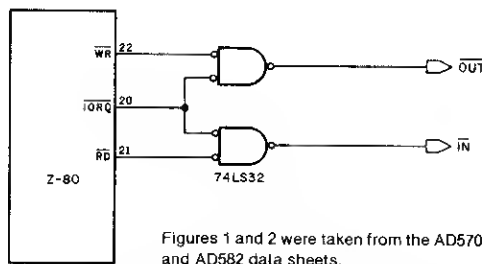


Fig. 2. Timing diagram of the AD570. Diagram from AD570 data sheet.



Figures 1 and 2 were taken from the AD570 and AD582 data sheets.

Fig. 3. Generation of the OUT and IN signals in the TRS-80.

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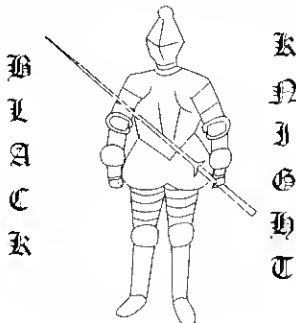
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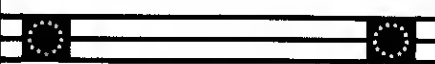
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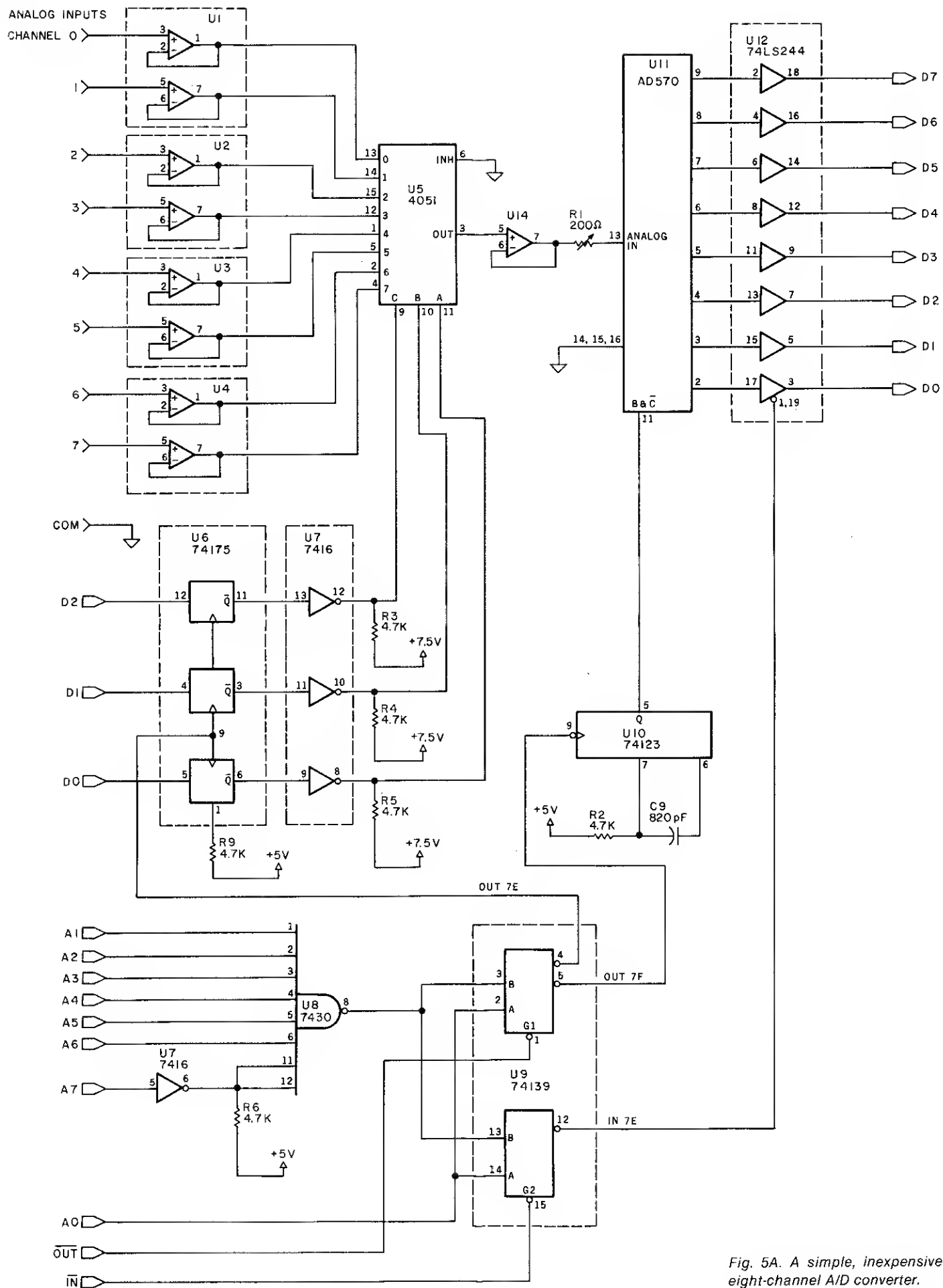


Fig. 5A. A simple, inexpensive eight-channel A/D converter.

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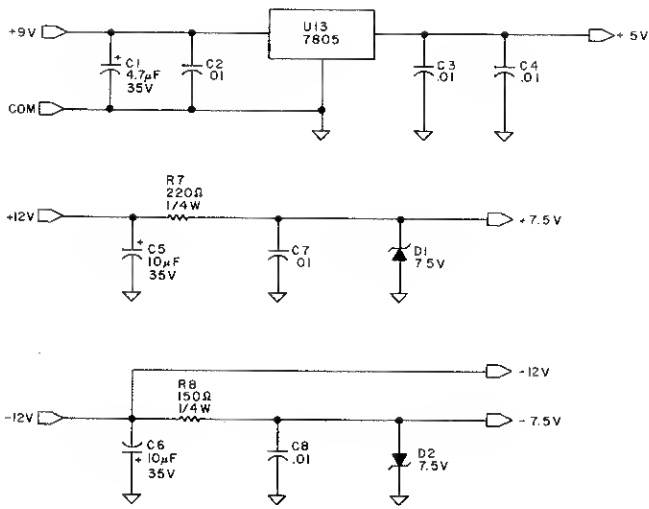


Fig. 5B. Circuitry for 5A.

accumulator will then contain the eight-bit representation of the analog signal at the input to the converter board.

A Word of Caution

No provision has been made to account for rapidly changing input signals. If an input has a value at the beginning of the

conversion period and it changes drastically during the process, this will confuse the converter.

If input variation is excessive, a circuit known as a sample-and-hold must be inserted, somewhere before the AD570, in order to hold the input steady during the conversion process.

This circuit typically is some sort of gated switch which charges a capacitor and maintains this charge during the conversion period. However, don't be too alarmed. This converter completes its cycle in less than 40 microseconds and most applications using this converter will work fine.

If it is desired to add a sample-and-hold circuit, Analog Devices makes one on a single chip, the AD582, sample-hold amplifier (SHA). A block diagram of this SHA and how it fits into the converter board is shown in Fig. 7. Notice that the buffer (U14 in Fig. 5) can be deleted because the AD582 SHA performs the buffer function as well as sample-and-hold.

When pin 12 of the AD582 is low (refer to Fig. 2), the SHA is in the sample mode. The output follows the input on pin 1 of the SHA. After the convert pulse is received by the AD570, the $\overline{DR}$ line goes high within 1.5 microseconds causing the AD582 to go into the hold mode.

The time constant of one-shot U10 (Fig. 5) must be lengthened to about six to eight microseconds to give the SHA time to stabilize before the negative-going edge of the convert pulse, which starts the conversion in the AD570.

The 300pf hold capacitor should be a high quality polystyrene or Teflon type with low dielectric absorption. There is also an optional null circuit shown in Fig. 7 to eliminate any D.C. offset during the hold period. However, this offset will then appear at the output during

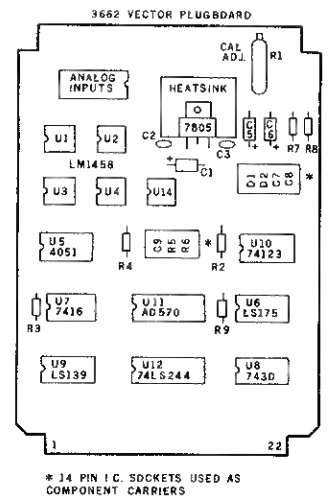


Fig. 6. Components mounted on a Vector 3662 plugboard.

the sample period.

Conclusion

The AD570 A/D converter chip makes easy work out of designing a fast, accurate A/D converter board. All of the critical components of the A/D converter are contained in the chip. Only address decoding, latching the channel number, and triggering the one-shots to initiate the conversion process need be added if desired.

If you desire to construct this A/D converter, first consult the data sheet supplied with the AD570 and AD582. These can normally be obtained through your local Analog Devices distributor. The data sheets contain a lot of useful information that I have not discussed, and also give additional information on other modes of operation which may be more suited for your particular application. ■

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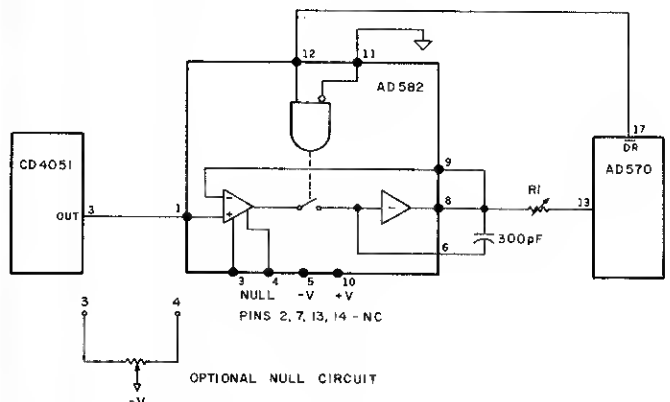


Fig. 7. A/D converter with AD582 SHA added.

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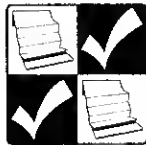
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For a year I put up with an enormous old Model 15 Baudot Teletype but just could not resign myself to its impossibly slow speed and lack of many common ASCII symbols.

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case, I originally intended to wait until I could afford a converted IBM Selectric, but the more I listened to that "... chunk... chunk... chunk..." the more I realized that 15 characters per second would never do; it had to be faster.

The new thermal printers didn't appeal to me at all, because they need special paper. Tractor or pin feed was a must, too—I was fed up with stopping the printer in order to adjust crooked paper. When Radio Shack started advertising the Line Printer II, I was ready to buy.

In my opinion, ordering anything from Radio Shack has two major disadvantages: They are notoriously slow on deliveries of new products, and their prices are outrageous. In this case they were asking \$979 for the printer, plus \$29 for the cable, so I decided to see what a Centronics dealer could do for me instead. A Centronics marketing manager told me that all the 730's were being held up by Centronics so that their 50 CPS speed could be increased. Even more interesting, he offered to sell me the speedier version, without the cable, for a considerably lower price! That did it: I ordered the printer and placed a separate order with Radio Shack for the cable.

Three weeks later my 730 arrived, carefully packed in foam and plastic in a little carton—in fact, so little that it was difficult to believe that I was holding the whole thing. It looked pretty, but, of course, the Radio Shack cable I had ordered hadn't arrived.

Another three weeks passed and still no cable. After a completely unsuccessful search in the local area for one of the connectors listed in the manual, I attended the Philadelphia Microcomputer Fair and returned with a \$35 cable that I had been assured was just right for Centronics printers. Alas, the 730 uses a different connector from the 779 and its ilk, and I still couldn't hook it up!

Finally, my Centronics dealer did a little digging in his manuals, located yet another compatible connector and mailed it to me without charge.

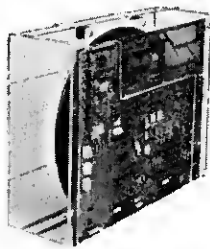
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The original advertisements all state a speed of 50 characters per second for the 730, but this is instantaneous print speed and does not include the carriage return. The printer is unidirectional, and the carriage takes almost as long to return as it does to print a line. The converted printers like mine operate at 31 full lines per minute. The



Photo 1. Centronics 730 Printer.

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DISKOS 570	5.3 Mbytes	floppy-size	(low)	(low)
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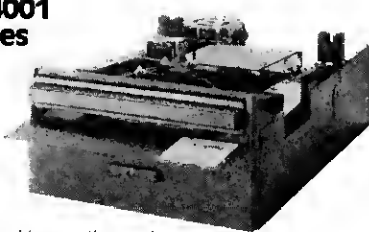
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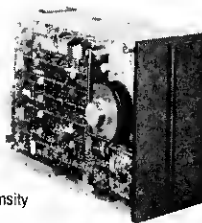
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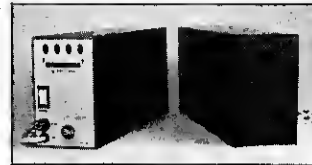
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SIRIUS 80+4 \$624.95

All 80+ Series Floppy Disk add-ons operate a 5 milliseconds track-to-track access time (eight times faster than the SA 400) but are Expansion Interface Limited to 12 milli-seconds for the TRS-80+.

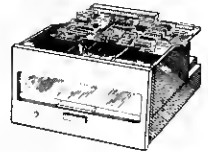
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```

10 'PRINTING DOUBLE-WIDTH CHARACTERS
20 LPRINT CHR$(27);CHR$(14)      : 'TURN ON WIDE
30 LPRINT "ABCDEFGH"; X; "HIJK"   : 'ALL WIDE
40 LPRINT "LMNOP"                 : 'NARROW
50 LPRINT CHR$(27);CHR$(14)      : 'TURN ON WIDE
60 LPRINT "QRS "; LPRINT "TUV"   : 'QRS WIDE, TUV NARROW
70 'USING STRINGS TO ALTERNATE WIDTHS
80 A$=CHR$(27)+CHR$(14)          : 'A$=WIDE
90 B$=CHR$(27)+CHR$(15)          : 'B$=NARROW
100 LPRINT A$;"ABC ";B$;"DEF ";A$;"GHI ";B$;"JKL" : 'ALTERNATE

```

```

A B C D E F G H I J K L
M N O P Q R S T U V
W X Y Z

```

Program Listing 1. Printing Double-Width Characters on a TRS-80.

new 100 CPS instantaneous print speed works out to an average of 41.33 characters per second of actual printing.

Characters are formed by a 7x7 dot-matrix impact print head and can also be printed in double width.

The printer circuitry contains an 80-character print buffer which allows a maximum printed line of 80 characters, printed 10 characters to the inch (six lines per vertical inch).

The manual implies that if more than 80 characters are entered before a carriage return, the line will be truncated and the last characters lost; but that isn't so unless you are using double-width characters, where the maximum 8-inch line width could be exceeded in under 80 characters. As soon as 80 characters have been received they are printed, the next 80 go into the buffer and are printed, etc.

An additional separate line feed buffer can store up to 255 line feeds, each of which moves the paper 1/6 of an inch. My model (730-1) also has a built-in automatic carriage return and line feed, so no extra control characters need be sent to get proper listings.

While on the subject of line feeds, there is one quirk. You cannot skip an extra line on the printer by typing LPRINT alone as you do on the screen. Instead you must print a blank (LPRINT " ") or LPRINT CHR\$(13), which is the control character 10 (line feed) plus a necessary 128. There are only two control switches on the printer! One is the usual ON-OFF switch, and the other is a RESET switch which allows the

printer to receive characters only in the ON position. RESET OFF stops the printing, clears the print buffer and returns the print head to the leftmost position. Unfortunately, there is no self-test mechanism built in, so the printer cannot be tried out without hooking it up to a computer.

Three Different Papers

The printer accepts three different kinds of paper: ordinary single sheets, eight and one-half-inch wide roll paper with five-inch diameter and a one-inch core (sold by Radio Shack for their 779 printer), or standard nine and one-half-inch fanfold paper with one-half-inch hole spacing that tears down to 8½ x 11-inch sheets. A holder is included for roll paper. The pins for fanfold paper are molded onto the plastic platen and cannot be adjusted for other widths.

A lever in the back can be turned to a vertical position for pin-feed or horizontal for friction-feed. Large thumb wheels

at each end of the platen are easily accessible for manual paper adjustments. There is no waste when tearing off sheets.

The plastic printer cover lifts off easily to get at the print head and ribbon. In comparison to the light plastic construction of the rest of the printer, the print head itself is quite a surprise: It's the same one as used in the much more expensive 700 series printers and should last through many years of service.

There is a little plastic swivel near the print head that can be turned to point to 1, 2, 3 or LOAD. The manual is pretty sketchy on use of this lever, other than saying it should be turned to "LOAD" (the most counter-clockwise position) whenever new paper is loaded. Since the head is closest to the paper on 1, I assume that the numbers are meant to stand for the number of sheets of paper being printed simultaneously. (You can supposedly print an original and two carbons, although I haven't tried it.)

The ribbon is a nightmare on first sight—yards and yards of ribbon (20 to be exact) lying loose in a tray. No reels! There is a Mobius twist in the ribbon, so that both sides will be used. A small drive roller pulls the ribbon and can be twisted manually counterclockwise to remove slack. Ribbon tensioners are little foam pads glued to the inside of the case.

Ribbon replacements come in a zip-pack which is placed in the compartment and pulled off the

ribbon in a sort of "yank the tablecloth out from under the plates" routine. I understand later ribbons will come in an easier-to-use cartridge. Ribbons are available inexpensively from Radio Shack.

The Manual

The 18-page manual, definitely a rush job, is supposed to be replaced by a better one. The main text and drawings are legible, but the schematic is not. Most of the manual consists of set-up instructions and drawings showing how to load various types of paper, change the ribbon and use the few controls. A pin diagram is included for the card-edge connector. There is no exploded diagram with accompanying part numbers, so if something goes wrong, it will be difficult to repair. A technical manual is also supposed to be in the works.

Double-Width Characters

All the manual says about double-width characters is that the two hex bytes 1B and 14 turn on the double-width function, while 1B and 15 turn it off again. It took a bit of experimentation to figure out how to use it with a TRS-80.

First let me mention some of the approaches that do not work! LPRINT CHR\$(23) or LPRINT CHR\$(151) accomplishes nothing. Since the line printer address is 37E8H (14312D) it would seem logical to POKE 14312,27;POKE 14312,14, but that only works if the POKES are

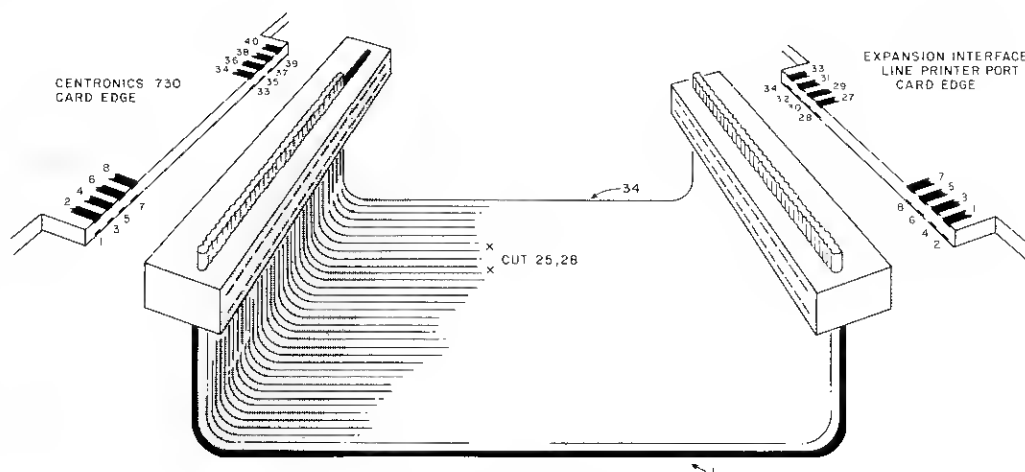


Fig. 1. Cable connections for the TRS-80.

the very first statement in the program and only for the first LPRINT following the POKEs; if you loop back to the POKEs, it won't work the second time around.

These three methods do work:

1. If you only want to LPRINT an occasional double-width character, you can LPRINT CHR\$(160) through CHR\$(255); these are the ASCII double-width characters corresponding to the normal ASCII characters 32-127.

Methods two and three are illustrated in Listing 1. Either method requires that the double-width function be invoked separately for each LPRINT statement requiring it.

2. Type LPRINT CHR\$(27); CHR\$(14) as in statements 20 and 50. Anything in the first LPRINT statement following will come out wide, while a second LPRINT in the same line will be

narrow.

3. Set up a string containing the two bytes, and LPRINT the string whenever you want wide characters. You don't need to bother turning off the wide print function, unless you want a combination of wide and narrow in the same LPRINT statement. In that case you would make a separate string for "off." This method is illustrated in statements 80-100.

If you've read this far, you've probably gotten the impression that I'm sold on my new printer, and you're right. I think it's a darn good buy for the money. The 730 is available in both parallel (730-1) and serial (730-3) versions. Be sure to order parallel for a TRS-80.

Making Your Cable

The cable required is a standard 34-conductor ribbon with 20 conductors to the inch. The

connector for the line printer port of the expansion interface is a 34-pin female edge-card connector, similar to the one for the CPU, except for the number of conductors.

The printer requires a 40-pin female edge-card connector with the same one-tenth-inch center-to-center pin spacing. Any one of the following connectors will work: Centronics #3123003Z, 3M #3464-0001, T&B Ansley #609-4015M, or Winchester #53-40-0. The connector used for the CPU interface cable is also correct.

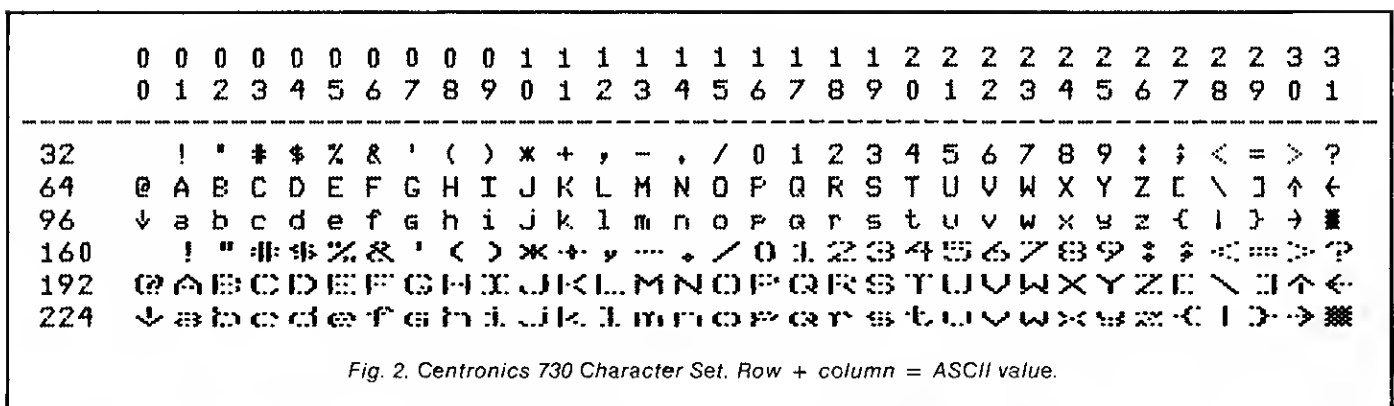
The diagram in Fig. 1 shows how to make up a cable for the TRS-80. Usually there is a blue coating on one edge of the ribbon: Use this to keep track of your number-one wire. The connectors come in two parts, with indentations to hold the individual conductors in the correct places.

When looking at the side of the expansion interface, pin #1 will be at the top right. Insert the cable into the expansion interface connector, hold the two parts together while you put it in a vice and squeeze. No soldering is required.

When looking at the back of the printer, pin #1 will be on the bottom left. Be sure you install the cable in the connector as far on the left as possible, leaving unused pins on the right. Use the same vice-squeeze routine.

After the connectors are installed, count over very carefully from wire #1 (marked in Fig. 1) on the cable near one of the connectors, make slits through the insulation surrounding wire #25 and #28 and cut out a small piece of each of these wires. An Exacto knife is good for this.

That's all there is to it—much faster than waiting for Radio Shack's cable. ■



Got any axis to grind?

Scatterplot

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University of North Carolina
Chapel Hill, NC 27514

It is often useful in business or science to examine one variable as a function of another.

Many methods are available to measure the strength of the relationship of these variables. One of the most common measures is the Pearson Product-Moment correlation coefficient (r correlation).

Calculating this measure is relatively simple, and the TRS-80

can perform the task with only a few Level II BASIC instructions.

The Scatterplot

Statistics are only numbers, and it is often more desirable to examine a graph of the data. Such a graph is known as a scatterplot.

Formerly, machine-generated scatterplots were reserved for individuals having access to one of the larger computers, but microcomputers have changed that. The graphics capabilities of the TRS-80 are limited, but they are adequate for this task.

The following program inputs values for two variables and outputs a graph of the data as a function of the variables. The total number of pairs of data and the value of the r correlation are displayed. The routine can be condensed to less than thirty lines. The method is straightforward and easily modified to conform to individual specifications.

The program begins by prompting the user to label and scale the axes of the graph. Since the procedure is simplified, numerical scale values are limited to integers. The output is designed to center two and

three-digit scale values, but should be easy to alter.

A counter is provided to assist with long data entries. Using a conversion procedure, proportional values corresponding to the X and Y function set are generated. After allowing for peripheral printing, the resulting graph is often smaller than the field from which the data originated, but in most cases this limitation is tolerable.

Following data input, the correlation statistic is computed. For those not interested in this information, simply delete the subroutine and the reference to it.

Once these steps are completed, output begins. Because the PRINT @ format is used for labels, scale values and statistics, these statements must appear before the set commands (trailing blanks of a PRINT @ can interfere with a previously executed set command). The axes and data points are then printed, using the set command.

Because the Y side of the set coordinates are larger units than the X side, the data points appear as rectangles, rather than squares, though this, too, can be altered. ■

```
10 CLS: PRINT "***** SCATTERPLOT *****"
11 *****
12 REM INPUT HEADING & SCALE INFORMATION
13 PRINT: PRINT: INPUT "TOTAL NUMBER OF X,Y PAIRS"; N
14 PRINT: INPUT "TITLE AND SCALE UNITS OF X (30 CHAR. MAX.)"; AS
15 PRINT: INPUT "TITLE OF Y (15 CHAR. MAX.)"; BS
16 PRINT: INPUT "SCALE UNITS OF Y (15 CHAR. MAX.)"; CS
17 PRINT: INPUT "ENTER MIN. & MAX. VALUES OF X (USE ,)"; X1,X2
18 PRINT: INPUT "ENTER MIN. & MAX. VALUES OF Y (USE ,)"; Y1,Y2
19 DIM XP(N),YP(N),XC(N),YC(N); CLS
20 REM INPUT DATA AND CONVERT TO GRAPHICS POINTS
21 FOR Z=1 TO N: PRINT Z: INPUT "ENTER X & Y (USE ,)"; X,Y
22 KC(Z)=X: YC(Z)=Y
23 CLS: XP(Z)=(85/(X2-X1))*(X-X1)+34: XP(Z)=INT(XP(Z))
24 IF YC(Z)=0 THEN YC(Z)=34
25 YP(Z)=37-(36/(Y2-Y1))*(Y-Y1): YP(Z)=INT(YP(Z))
26 NEXT Z: PRINT "**** WORK IN G ****": GOSUB 250: CLS
27 REM PRINT AXIS TITLES & SCALES
28 PRINT @128,BS: PRINT @192,CS: PRINT @640,"N=";N: PRINT @704,
  "R="; R
29 PRINT @11,Y2: PRINT @523,INT(((Y2-Y1)/3)+Y1): PRINT @267,INT(
  (((Y2-Y1)/3)*2)+Y1): PRINT @779,Y1
30 PRINT @847,X1: PRINT @861,INT(((X2-X1)/3)+X1): PRINT @875,X2
31 PRINT @928,AS
32 REM PRINT AXIS AND SET DATA POINTS
33 FOR Y=0 TO 38: SET (34,Y): SET (35,Y): NEXT Y
34 FOR X=32 TO 121: SET (X,37): NEXT X
35 FOR Y=1 TO 31 STEP 6: SET (32,Y): SET (33,Y): NEXT Y
36 FOR X=48 TO 118 STEP 14: SET (X,38): SET (X+1,38): NEXT X
37 FOR W=1 TO N: SET (XP(W),YP(W)): NEXT W
38 GOTO 240
39 REM SUBROUTINE TO COMPUTE CORRELATION
40 FOR W=1 TO N
41 XT=XP(W): XS=XS+XP(W): YT=YP(W): YS=YS+YP(W)
42 CP=CP+XP(W)*YC(W): NEXT W
43 MX=XT/N: MY=YT/N
44 VX=SQR((XS/N)-(MX^2)): VY=SQR((YS/N)-(MY^2))
45 R=((CP/N)-(MX*MY))/(VX*VY): RETURN
```

Program Listing

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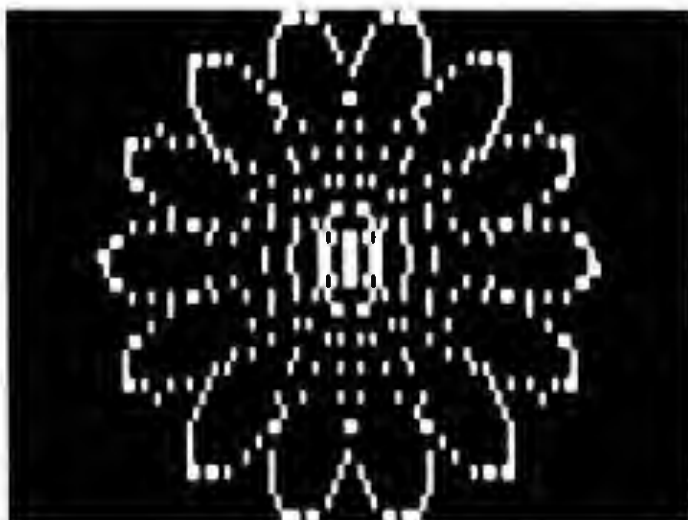
A scale factor must be input to determine the figure size (some suggested scale factors are included for experimentation).

The programs are written for the TRS-80's display area of 128 by 48. The origin of the curves is near the center of the screen (at 65, 23), the x-axis is horizontal and the y-axis is vertical (the two axes are not displayed). To simplify the programs and allow the visible creation of the curves as the angle parameter changes, BASIC has been used for the curve generation instead of assembly.

Polar Curves

The polar coordinate curves are plotted as if the screen were a sheet of polar coordinate paper with the pole at the center and the polar axis horizontal. This axis is not displayed with the programs given here.

Program 1 is to be used for



Photographs by William R. Tinsley

Photo 1. A many-leaved rose using Program 1 with $S = 8$, $A = 3.5$ and line 30 having 0 TO $4 \cdot \pi$ STEP $2 \cdot \pi / 180$.

curve equations, in polar form, with bounded extent.

```
10 ON ERROR GOTO 120
20 PI=3.14159
30 INPUT "SCALE FACTOR = "; S;
  INPUT "CONSTANT = "; A
40 CLS
50 FOR I=0 TO 2*PI STEP 2*PI/180
60 R=COS(A*I); REM THIS LINE IS
  CHANGED FOR OTHER POLAR
  CURVES
70 X=65+4.9*S*R*COS(I)
80 Y=23-2.3*S*R*SIN(I)
90 SET(X,Y)
100 NEXT I
110 GOTO 110
120 RESUME NEXT
```

Program 1.

Enter the program and type RUN. When the input prompt, ?, appears use 10, and then 2 for the second input prompt. A four-leaved rose (rhodonea) is sketched. To terminate the display, press the BREAK key.

To obtain other rhodonea, with different numbers of

leaves, try the following choices for the scale factor S and the constant A.

S	9	9	5	10	10	8
A	3	4	4	6	5	3.5

Be sure to use the BREAK key for every new curve. Note that the larger the S, the larger the figure; also that when A is an integer, there are A leaves for A odd, but 2A leaves for A even.

For non-integer A, the leaves overlap considerably and the figure appears incomplete. To complete the figure a larger number than $2 \cdot \pi$ in line 50 is needed (try $4 \cdot \pi$, or some other multiple of $2 \cdot \pi$).

Now use $R = 1 + A \cdot \cos(I)$ for line 60. If $A = 1$ (and S of perhaps 5), the figure is heart-shaped (a cardioid). If $A = 2$ we have a trisectrix (let S be 4); for $A < 1$ there is one loop, and for $A >$

1 there are two loops. The curves are called limacons of Pascal.

Here are some other curves created by changing line 60, and by increasing $2 \cdot \pi$ to $4 \cdot \pi$ in line 50. Freeth's nephroid has $R = 1 + 2 \cdot \sin(1/2 + A)$ for its equation (try $S = 3, A =$). Folia are given by $R = \cos(I) \cdot (A \cdot \sin(I) \pm 2 - 1)$ (try $S = 10, A = 3$); and the equation for Cayley's sextic is $R = \cos(I/3 + A)^3$ (try $S = 11, A = 3$ and see where the loop is located).

Changing the constant A in either Freeth's nephroid or Cayley's sextic rotates the figure. Experiment by observing the orientation of the loop in Cayley's sextic for the following S, A combinations.

S	10	9	9
A	1.7	2.4	0

These combinations have bounded values for the parameter I (such as 0 to 2π , or 0 to 4π). For interesting figures that have unbounded parameters for I use Program 2.

```
10 ON ERROR GOTO 130
20 PI=3.14159; W=2*PI/60; I=W
30 INPUT "SCALE FACTOR = "; S;
  INPUT "CONSTANT = "; A
40 CLS
50 R=A/I; REM THIS LINE IS
  CHANGED FOR OTHER POLAR
  CURVES
60 FOR J=1 TO 2:I=-1
70 X=65+4.9*S*R*COS(I)
80 Y=23-2.3*S*R*SIN(I)
90 SET(X,Y)
100 NEXT J
110 I=I+W
120 GOTO 50
130 RESUME NEXT
```

Program 2.

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Program 2 creates a hyperbolic spiral (try $S = 15$, $A = 1$). A cross curve has $R = A \cdot \text{SQRT}(1/\text{COS}(I)^2 + (1/\text{SIN}(I)^2))$ for line 50 (try $S = 1$, $A = 3$). You can increase the number of plotted points by changing the 60 in line 20 to 120.

A folium of Descartes is plotted if line 50 is $R = A \cdot \text{SIN}(I) \cdot \text{COS}(I) / (\text{SIN}(I)^3 + \text{COS}(I)^3)$. This has an interesting shape for $S = 2$, $A = 5$. Many other curves with polar equation forms can be handled with Programs 1 and 2. Some of these curves will be presented in terms of parametric equations.

Parametric Equation Curves

Program 3 modifies Program 1 to allow parametric equations. The program is designed to simulate plotting in the Cartesian plane with usual graph paper.

```

10 ON ERROR GOTO 130
20 PI=3.14159
30 INPUT "SCALE FACTOR = "; S:
   INPUT "CONSTANTS A, B"; A, B
40 CLS
50 FOR I=0 TO B*.PI STEP
   2*.PI/90
60 X1=(A-B)/B.COS(I)+COS
   ((A-B)/B.I)
70 Y1=(A-B)/B.SIN(I)-SIN
   ((A-B)/B.I)
80 X=65+4.9.S.X1
90 Y=23-2.3.S.Y1
100 SET(X,Y)
110 NEXT I
120 GOTO 120
130 RESUME NEXT

```

Program 3.

The parametric equations for the curves are in lines 60 and 70 with the x-coordinate called X1, the y-coordinate Y1 and I for the parameter.

The equations already listed in lines 50 and 60 represent the roulettes called hypocycloids, and give the curve traced by a point on the circumference of a circle rolling on the inside of a larger fixed circle. You might want to start experimenting using the following choices.

S	2	2	3	2.8	3	6
A	5	9	10	7	9	7.2
B	1	2	3	2	3	4.6

Did you notice that if $(A - B)/B$ is an integer, there are A/B

cusps (vertices)? Also if $A - B$ is larger than B and if $A - B$ and B are relatively prime (no common factors except ± 1), you see A cusps in B revolutions? Finally, did you note that when A and B are not integers, the figure is not completed symmetrically?

If you would like to see the larger fixed circle, add the following to Program 3. Try this with some of the choices for S, A and B suggested above.

```

52 FOR J=1 TO 2
54 IF J=1 THEN 60
56 X1=A/B.COS(I)
58 Y1=A/B.SIN(I)
59 GOTO 80
105 NEXT J

```

Epicycloids are obtained by tracing a point on the circumference of a circle rolling on the outside of a larger fixed circle. To sketch these you need only change the + in line 60 to a - and change the A/B in lines 56 and 58 to $(A - 2*B)/B$. Some interesting patterns are obtained with the following choices.

S	2	2	1	3
A	5	9	16	9
B	1	2	2	3

Epicycloids have $(A - 2*B)/B$ cusps when this number is an integer, and $A - 2*B$ cusps (lying on the fixed circle) in B revolutions when $A - 2*B$ and B are relatively prime with $A - 2*B > B$.

If you delete lines 52 through 59 and line 105, and change lines 60 and 70 to read:

```

60 X1=COS(I)/(1+SIN(I)^2)
70 Y1=X1.SIN(I)

```

the resulting figure is called a lemniscate of Bernoulli. A nice sized sketch is obtained with $S = 9$. (Note the constants A and B are not used here, but you can input $A = 1$ and $B = 1$ when asked by the program or delete the last half of line 30.)

Some very interesting curves, called Lissajous figures, or Bowditch curves, can be obtained using parametric equations. Make the following changes in Program 3.

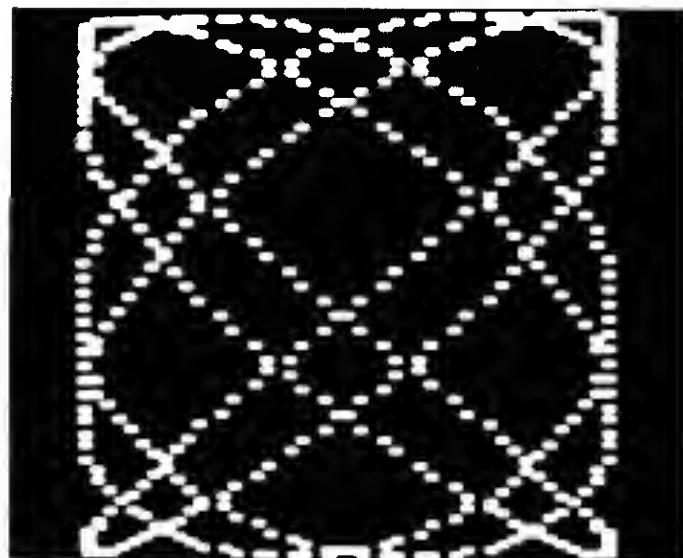


Photo 2. Hypocycloid using program 3 with $S = 2$, $A = 9$, $B = 2$ and with lines 52 through 59 and line 105 added.

```

30 INPUT "SCALE FACTOR = ";
   S: INPUT "CONSTANTS
   A,B,C"; A,B,C
50 FOR I=0 TO 10*.PI STEP
   2*.PI/90
60 X1=SIN(A-I+B)
70 Y1=C.SIN(I)

```

Here are some choices you might want to try.

S	12	10	11	12
A	.75	.4	.8	.67
B	0	.75	2	2.8
C	.8	1	.9	.7

String Art on the Computer

Constructing curves with the computer is done in much the same way that string art figures are made. To illustrate the possibilities let's construct a cardioid (the heart-shaped figure mentioned earlier) and an astroid (a four-pointed star, or hypocycloid of four cusps).

For the cardioid begin with a fixed circle C and a fixed point PF (use the point on the circum-

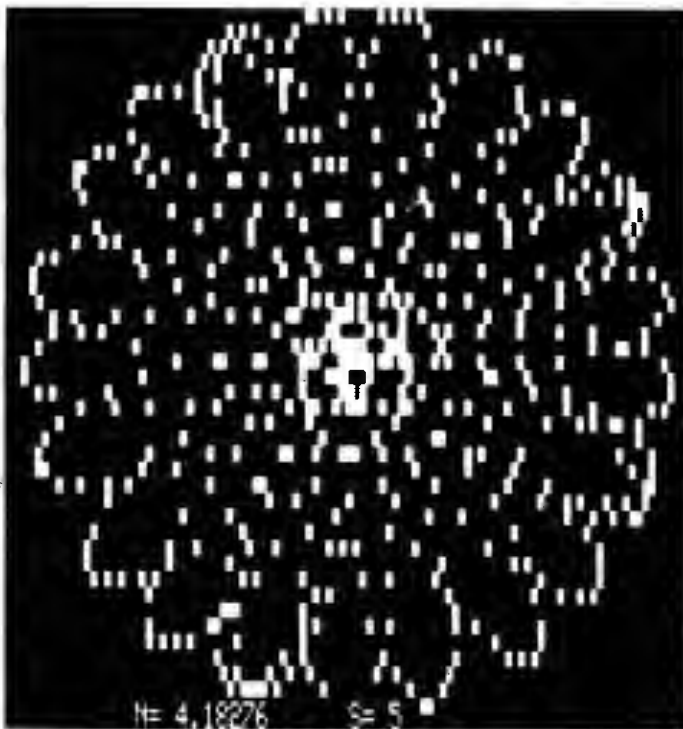
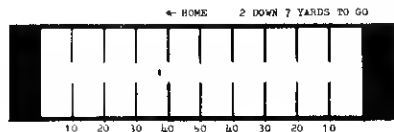


Photo 3. Cardioid using Program 4 with a fixed circle size of 9.

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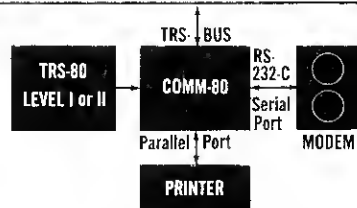
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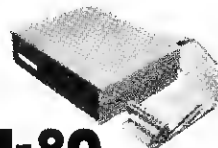
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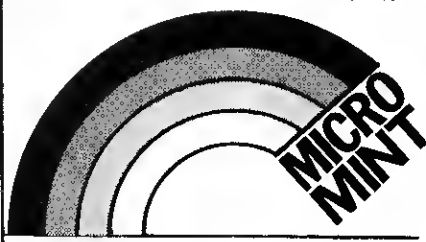
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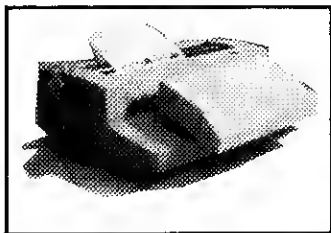
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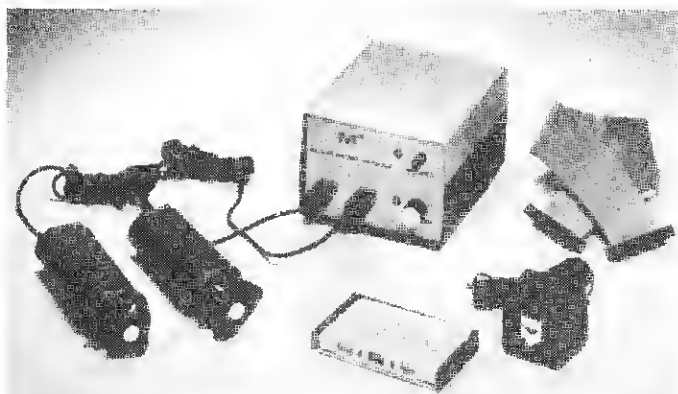
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Photo 4. Astroid using Program 5 with A-value of 5.

ference at the extreme left of the circle for PF). Then choose a number of points (XO, YO) on C and draw circles with centers at (XO, YO) and with radii equal to

the distance between PF and (XO, YO). The curve generated by these circles is the desired cardioid. Program 4 creates the circles and the cardioid.



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```
10 ON ERROR GOTO 170
20 INPUT "SIZE OF FIXED
   CIRCLE": A
30 CLS
40 PI=3.14159
50 FOR I = -PI TO PI STEP 2*PI/180
60 X1=A*COS(I): Y1=A*SIN(I)
70 SET(63+2.2*X1, 23+Y1)
80 NEXT I
90 FOR J = -PI TO PI STEP 2*PI/20
100 XO=A*COS(J): YO=A*SIN(J)
110 R=SOR((XO+A)^2+YO^2)
120 FOR K = -PI TO PI STEP 2*PI/90
130 X=XO+R*COS(K):
    Y=YO+R*SIN(K)
140 SET(63+2.2*X, 23+Y)
150 NEXT K,J
160 GOTO 160
170 RESUME NEXT
```

Program 4.

You might try an A of 8 or 9 for a nice sized display. If XO + A in line 110 is changed to XO - A, the cardioid is turned 180° since the point PF is now on the extreme right of the circle.

Lines instead of circles will generate the four-pointed astroid star. With x- and y-axes positioned so the origin is at the center of the screen, and a line RS of fixed length 4*A, we draw several copies of the line with R always on the x-axis and S always on the y-axis.

Program 5 allows different choices for A (values between 4 and 7 give nice displays) and draws the RS lines two at a time, one above and one below the x-axis.

```
10 ON ERROR GOTO 120
20 INPUT "A-VALUE": A
30 CLS
40 O=4*A*19/20
50 FOR X = -Q TO Q STEP 4*A/20
60 FOR XX=X TO 0 STEP -X/10
70 Y=(1-XX/X)*SOR(16*A^2-XX^2)
80 SET(63+2.4*XX, 23+Y)
90 SET(63+2.4*XX, 23-Y)
100 NEXT XX, X
110 GOTO 110
120 RESUME NEXT
```

Program 5.

The astroid can also be generated using ellipses since the envelope of the ellipses $X = A \cdot \cos(I)$, $Y = (1-A) \cdot \sin(I)$ is the astroid $X = \frac{1}{4} \cdot (3 \cdot \cos(I) + \cos(3 \cdot I))$, $Y = \frac{1}{4} \cdot (3 \cdot \sin(I) - \sin(3 \cdot I))$.

Computer Spirograph

The last program presents a panorama of hypocycloids, epicycloids and rhodonea (roses) generated in random order and sizes. If the curve sud-

denly disappears, the random size is too big for the screen, but don't worry! The curve will reappear in a smaller size.

```
10 ERROR GOTO 210
20 RANDOM
30 N=7*RND(0): T=RND(4)
40 S=RND(6)
50 CLS
60 PI=3.14159
70 FOR I=0 TO 6*PI STEP 2*PI/180
80 ON T GOTO 90, 100, 120, 130
90 X1=N*COS(I)+COS(N*I): GOTO 110
100 X1=N*COS(I)-COS(N*I)
110 Y1=N*SIN(I)-SIN(N*I): GOTO 150
120 R=3+2*COS(N*I): GOTO 140
130 R=5*SIN(N*I)
140 X1=R*COS(I): Y1=R*SIN(I)
150 X=65+49/S:X1=Y=23+23/S:Y1
160 SET(X,Y)
170 NEXT I
180 PRINT @960, "T="; T, "N="; N,
    "S="; S
190 FOR J=1 TO 1250: NEXT J
200 GOTO 30
210 S=S+1: RESUME 50
```

Program 6.

After each curve is constructed the values for T, N and S are displayed for a short period at the bottom of the screen. If you don't want these values shown, delete line 180. If you prefer fewer points drawn, change the step size in line 70 to 2*PI/90, or 2*PI/60, etc.; more points may be obtained with 2*PI/360.

In line 70 the parameter I makes three revolutions (0 to 6π). If more (fewer) revolutions are desired, change the 6*PI to 10*PI(4*PI), etc. ■

References

A Book of Curves by E. H. Lockwood, Cambridge University Press, 1961.

A Catalog of Special Plane Curves by J. Dennis Lawrence, Dover Publications, 1972.



Photo 5. Random pattern using Program 6. The value of N and S is displayed.

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Sound X

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Sound can add a lot to any game program, but it's not

nearly as widely used as it could be. The main problem is that the TRS-80 does not have a built-in speaker, and Radio Shack has never marketed a speaker/amplifier as a peripheral.

But, it isn't difficult to get sound from the TRS-80 cassette port. The hardware is very simple. Just take the large gray plug that normally plugs into the

recorder's auxiliary input and connect it to an amplifier and speaker instead. Or purchase Radio Shack's Microsonic box that includes amp and speaker.

Software

As for software, BASIC is too slow to generate sound. Machine language is required in the form of a driver program that can be called from BASIC. Such programs have been described before and some are available for a price. Sound X is the equal of most of these and combines the following features:

- It is easily called from BASIC via the USR command.
- It works identically under Level II or Disk BASIC.
- It is completely relocatable, and thus can be POKEd anywhere in memory without reassembly.
- It offers a wide range of frequencies (0 to 8 KHz).
- It offers a number of different "sounds," both loud and soft.
- It is suitable for imbedding into string space or REM statements (no need for memory protect).
- It is short (72 bytes).

Using Sound X

Once the sound driver has been put in memory (as described later), calling it from BASIC is simple. The user must first specify the tone duration, which is done by writing:

X = USR (dd)

X is a dummy variable. The value dd must be a number between -1 and -32767. The smaller this number is, the longer the tone will be. The range is 0 to 2 seconds. Once a duration has been specified, it will control all subsequent tones until a new duration is specified.

To actually generate a tone, the user writes:

X = USR (pp)

The value pp can be any number between 1 and 32767; it defines the pitch. The larger the value for pp, the lower the pitch will be. Actually, only values for pp in the range of 1 to 100 are useful. A silent duration is generated by using a value of 0 for pp.

The following calls in a BASIC program would put out two tones. The first tone would be long and low-pitched, the second tone short and high-pitched:

```
10 X = USR( - 20000)
20 X = USR(50)
30 X = USR( - 2000)
40 X = USR(2)
```

If line 30 is deleted, both tones will be long.

The USR calls are simple

```
10 REM      >>>>> SOUND X <<<<<<
20 REM
30 CLS
40 DEFINT J,K,L
50 INPUT "WHAT MEM SIZE DID YOU SET ";DS
60 REM SOUND X WILL START AT MEM SIZE PLUS ONE
70 MS=DS
80 IF MS>32767 THEN MS=MS-65536
90 REM POKE THE 72 BYTES IN
100 FOR J=1 TO 72
110 READ K
120 POKE MS+J,K
130 NEXT J
140 REM NOW SEE IF WE'RE IN LEVEL II OR DISK BASIC
150 IF PEEK(16433) = 0 THEN 200
160 REM      MUST BE DISK
170 CMD"T"
180 DEFUSR=MS+1
190 GOTO 290
200 REM      IT'S LEVEL II
210 N=DS+1
220 REM CHANGE N FROM DEC TO HEX FOR USR ENTRY POINT POKE
230 FOR I=1 TO 4
240 D(I)=INT(N/16){(4-I)}
250 N=N-D(I)*16{(4-I)}
260 NEXT I
270 POKE 16527, 16*D(1)+D(2)
280 POKE 16526, 16*D(3)+D(4)
290 REM CHOOSE SQUARE WAVE FOR DEMO
300 POKE 16672,102
310 REM THIS IS THE BIG DEMO . . .
320 X=USR(-100)
330 FOR L=65 TO 1 STEP -1: X=USR(L): NEXT
340 FOR L=1 TO 70 STEP 2: X=USR(L): NEXT
350 REM
360 REM THESE FIVE DATA STATEMENTS CONTAIN THE RELOCATABLE
370 REM CODE OF SOUND X:
380 REM
390 DATA 205,127,10,203,124,40,4,34,28,65,201,34,30,65
400 DATA 219,255,31,31,31,47,230,248,95,58,57,65,254,4,32,2
410 DATA 171,95,58,32,65,87,237,75,28,65,43,124,181,40,6
420 DATA 221,227,221,227,24,12,42,30,65,122,7,7,87,230,3,179
430 DATA 211,255,3,120,177,32,228,123,211,255,201
```

Note: Left bracket [is up arrow ↑ in line 240.

Fig. 1. Program to POKE Sound X into memory.

enough, and often they are all that will be used. There are a few preliminaries and options. First, the user must select a "voice" or type of sound by POKEing a value into address 16672. Only 10 values give distinct voices. These are: 1, 5, 6, 17, 18, 22, 25, 86, 90, 102.

Some of these do not give different types of sound; they give a tone of twice the normal pitch. Just as with tone duration, the voice need not be re-specified until a different one is desired.

Near the beginning of a program you might write:

POKE 16672,18

All tones generated after this would be fairly smooth sine wave approximations. For a noticeably softer sound, write POKE 16672,5. For a thin, reedy sound use POKE 16672,25.

In Disk BASIC, the user should disable interrupts with CMD T to avoid tones which pop, sounding like radio static.

By working with a combination of tone duration, pitch, voice, and speed of call from BASIC, one can eventually arrive at a suitable sound effect for almost any application.

Under BASIC it is possible to use OUT 255,4 or OUT 255,12 to turn the cassette motor on. Sound X will normally turn off the cassette motor whenever it is called. Should the user wish to run the cassette during his program (possibly even during the generation of sound), he should inform Sound X of this fact with a POKE 16697,4. To go back to having the cassette motor disabled, POKE 16697,0.

Of course, you must begin by defining the USR entry point. This is discussed in the Level II and Disk BASIC manuals. Sound X achieves its relocatability by using the six bytes in low memory—the reserved section of RAM—for temporary data storage. These bytes are hex 411C-4120 and 4139.

Creating the Sound X Code

There are many ways to get

the 72 bytes of code into memory. Using the assembly-language source listing in Fig. 2, Sound X can be assembled into any location and SAVED as a tape or disk object file. This can then be loaded under DOS or using the SYSTEM command from BASIC. This technique requires memory protection via MEM SIZE. As listed, the code resides at the very top of 48K; this can be changed with a new ORG address.

A BASIC program can POKE the code into memory. If high memory is to be used (the usual approach), then MEM SIZE must be answered to protect the code from BASIC. Since Sound X does not contain any zero bytes, it is feasible to POKE the code into a dummy REM statement instead. This avoids having to protect memory, since Sound X is an integral part of the BASIC program itself. Both of these techniques will be presented.

The BASIC program listed in Fig. 1 will POKE Sound X into memory. The program may look complicated, because it has been set up to handle different combinations of BASIC level and memory size. Any single application will really require only the READ, DATA and POKE statements; these can be extracted and used as needed in the user's program.

For example, you might want sound in a 16K Level II game. Memory size is then set at 32695, assuming there are no other high-memory machine language routines to be used. If there are, Sound X would have to be loaded below them.

Once into BASIC, the program of Fig. 1 is loaded and run. On completion, a demo sound plays. The Sound X code can then be SAVED as a SYSTEM tape using T-BUG.

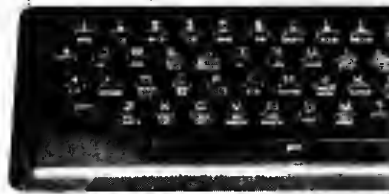
A more convenient alternative incorporates the data statements into your own program, and POKes them into (protected) high memory, starting at 32696.

Once either code is in memory, you will define the USR entry point (32696) to BASIC with:

POKE 16526,184 : POKE 16527,127

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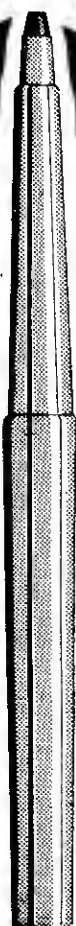
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as explained in the Level II manual.

Storing Sound X in a REM Statement

A dummy REM statement is used as line 1 in a BASIC program. The Sound X code is then POKEd by the BASIC program itself. The REM statement must have at least as many dummy characters in it as there are bytes in the machine code. Finally, the USR entry point is defined to point at the string of code now in the REM line.

The POKE can be done by the target program every time it is run, or it can be done just once

after which the DATA, READ, and POKE statements can be deleted and the target program SAVED. The advantage of the former is that the program remains entirely listable and readable.

If the program is SAVED after the code has been POKEd into line 1, that line will not list properly; nor can it be SAVED later as an ASCII file, meaning that some renumbering utilities will not work with it.

On the other hand, with the code imbedded, the program is shorter and requires no initialization time. I prefer the latter.

Either way, the first line of the

```

01260 ;
01270 ; BY ROXTON BAKER -
01280 ;
01290          ORG      0FFB8H      ;FOR 48K. 72 BYTES.
01300          PORT     EQU      0FFH      ;CASSETTE PORT
01310          GETARG    EQU      0A7FH      ;PASSES USR VALUE IN HL
01320          CASSOP    EQU      4139H      ;WILL HAVE 04 IN IT IF
01330          LENGTH     EQU      411CH      ;USER WANTS CASSETTE ON.
01340          FREQ       EQU      411EH      ;STORAGE FOR 'LENGTH'
01350          WAVBYT     EQU      4120H      ;STORAGE FOR 'FREQ'
01360          CALL      GETARG      ;THE FOUR PAIRS OF BITS
01370          BIT        7,H          ;POKED INTO THIS BYTE
01380          JR         Z,CONT1      ;DEFINE THE SOUND WAVE-
01390          LD          (LENGTH),HL ;FORM.
01400          LD          (FREQ),HL    ;GET USR ARGUMENT
01410          LD          (WAVBYT),HL  ;IS THE ARG NEG?
01420          LD          (CASSOP),HL ;NO - IT'S A FREQ.
01430          LD          (PORT),HL   ;YES - STORE AS LENGTH
01440          LD          (FREQ),HL   ;AND RETURN TO BASIC.
01450          LD          (CASSOP),HL ;ARG IS NON-NEG. STORE
01460          LD          (PORT),HL   ;AS FREQUENCY VALUE.
01470          LD          (FREQ),HL   ;IF BIT 6 IS SET (64
01480          LD          (PORT),HL   ;CHAR/LINE) THEN WE WANT
01490          LD          (CASSOP),HL  ;BIT 3 TO BE ZERO WHEN
01500          LD          (PORT),HL   ;WE OUTPUT LATER.
01510          LD          (FREQ),HL   ;ALWAYS WANT THREE LSB'S
01520          LD          (PORT),HL   ;TO BE ZERO -
01530          LD          (CASSOP),HL ;UNLESS USER WANTS BIT 2
01540          LD          (PORT),HL   ;HIGH TO USE CASSETTE.
01550          LD          (FREQ),HL  ;IN WHICH CASE THIS IS 4
01560          LD          (PORT),HL  ;AND MODIFIES PORTWORD.
01570          LD          (CASSOP),HL;EITHER WAY, THE
01580          LD          (PORT),HL   ;ENDS UP IN E.
01590          LD          (FREQ),HL   ;PUT WAVEFORM IN D.
01600          LD          (PORT),HL  ;INITIALIZE OUR LOOP
01610          LD          (CASSOP),HL;START COUNTING DOWN THE
01620          LD          (PORT),HL   ;FREQ COUNTER. WHEN IT
01630          LD          (FREQ),HL   ;REACHES ZERO, GO CHANGE
01640          LD          (PORT),HL   ;PORT TO MAKE SOUND.
01650          LD          (CASSOP),HL;ELSE DELAY TO EQUALIZE
01660          LD          (PORT),HL   ;SOUND AND NO-SOUND
01670          LD          (FREQ),HL   ;AND GO CHECK DURATION.
01680          LD          (PORT),HL   ;RESTORE FREQ COUNT FOR
01690          LD          (CASSOP),HL;NEXT CYCLE.
01700          LD          (PORT),HL   ;PUT WAVEFORM IN A.
01710          LD          (FREQ),HL   ;BRING NEXT TWO BITS
01720          LD          (PORT),HL   ;OF WAVEFORM INTO ACTION
01730          LD          (CASSOP),HL;FOR NEXT CYCLE.
01740          LD          (PORT),HL   ;DROP ALL BUT 2 LSB'S.
01750          LD          (FREQ),HL   ;MERGE IN 6 LSB'S OF
01760          LD          (PORT),HL   ;PORTWORD -
01770          LD          (CASSOP),HL;AND SEND THE 2 LSB'S TO
01780          LD          (PORT),HL   ;THE SPEAKER.
01790          LD          (FREQ),HL   ;HAS THE TONE BEEN LONG
01800          LD          (PORT),HL   ;ENOUGH YET?
01810          LD          (CASSOP),HL;NO - DO ANOTHER CYCLE.
01820          LD          (PORT),HL   ;DONE. PUT KNOWN VALUE
01830          LD          (FREQ),HL   ;OUT TO SPEAKER TO AVOID
01840          LD          (PORT),HL   ;TRANSIENTS NEXT TIME.
01850          LD          (CASSOP),HL
01860          LD          (PORT),HL
01870          LD          (FREQ),HL
01880          LD          (PORT),HL
01890          LD          (CASSOP),HL
01900          LD          (PORT),HL
01910          LD          (FREQ),HL
01920          LD          (PORT),HL
01930          LD          (CASSOP),HL
01940          LD          (PORT),HL
01950          LD          (FREQ),HL

```

Fig. 2. Source Listing for Sound X.

user's BASIC program should be:

1REM***** (continue for 72 *'s total)

Next, it is necessary to locate the address of the first asterisk so that Sound X POKE can begin there. This address is fixed in the sense that we are always using the first line, but Level II, TRSDOS and NEWDOS all put the first line at a different place. However, they all point to it the same way—its address is kept at locations 16548, 16549. The first * is always the fifth byte in the first line (even if it doesn't look like it). So its address is simply:

PEEK(16548) + 256 * PEEK(16549) + 5

Putting all this together, the following lines, placed at the beginning of the user's Disk BASIC program, imbed the Sound X routine. After running the program once the user could

delete lines four through 12 and save the program with the machine language now permanently integrated into it.

```
1REM***** (72 *'s total) *****
2 S=PEEK(16548) + 256 * PEEK(16549)
+ 5
3 DEFUSR = S
4 FOR J=1 TO 72
5 READ X
6 POKE S+J-1,X
7 NEXT J
8 DATA .....
9 DATA .....
10 DATA .....
11 DATA .....
12 DATA .....
13 etc. user's program from here on.
```

For Level II BASIC line 3 has to be changed. An example of how to convert a decimal memory address into the correct POKE statements for a Level II USR entry address, is given in lines 200-280 of Fig. 1.

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A very short BASIC program that allows you to investigate your graphic capabilities.

Basic Drawing

Buzz Gorsky, K8BG
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Cleveland, OH 44106

SET, RESET and POINT commands.

The screen is divided into a number of boxes, each of which can be identified by two integers—one indicating the location along the horizontal or X axis, and the other showing the location on the vertical or Y axis.

The upper left corner of the screen is indicated by the pair (0,0). Moving across the screen the X value can be any integer between 0 and 127; moving down the screen the Y value can be any integer between 0 and 47. Thus (127,47) indicates the block in the lower right corner of the screen.

SET(X,Y) turns on the graphic block indicated by the value of X and Y, RESET(X,Y), turns off the

block and POINT(X,Y) will be 0 if a graphic block is off and -1 if it is on.

How the Program Works

The program uses these commands and INKEY\$, which scans the keyboard without requiring that the ENTER key be used, to draw, or turn on blocks, erase, or turn off blocks, and to move around the screen without permanently changing the status of the blocks.

Statements 30 to 45 give directions for the use of the program. These directions do not appear again since the screen will be used for drawing. Statement 50 takes care of the required housekeeping; establishing fields for subscripted

variables and defining some as integers and B as a string. X and Y are also set to zero.

Lines 200 to 230 compose the drawing routine. The keyboard is first strobed and the value obtained given to B. We then test to see if (X,Y) is turned on. If it is, we turn it off and then on again. If (X,Y) is not on, we turn it on, then off again. This sequence leaves the block in its original status, but creates a blinking effect so the user can see what is happening on the screen.

If the letter X is depressed, the program branches to the executive routine at 3000. If it was not depressed, control goes to the subroutine beginning at 2000.

This subroutine is central to the program. The user can de-

Program Listing

```
30 CLS:PRINT"THIS PROGRAM WILL LET YOU DRAW ON THE TRS80 SCREEN":
  PRINT"A GRAPHICS BLOCK BLINKING ON AND OFF LETS YOU KNOW THE
  PROGRAM IS RUNNING"
40 PRINT"THE X KEY LETS YOU CHANGE MODES":PRINT "AFTER HITTING X
  YOU CAN HIT ONE OF THE FOLLOWING:PRINT"D TO DRAW, E TO ERAS
  E, M TO MOVE THE CURSOR, R TO RECORD A PICTURE, AND P TO PRI
  NT A":PRINT"PICTURE FROM TAPE."
45 PRINT"IN DRAW,ERASE, AND MOVE MODES A U MOVES CURSOR UP, D MOV
  ES IT":PRINT"DOWN, L IS FOR LEFT AND R FOR RIGHT.":INPUT "HI
  T ENTER TO START THE PROGRAM.":XS
50 DEFSTR B:DEFINT X,Y,I,N:DIM X(127),Y(47):X=0:Y=0:CLS
200 REM DRAW ROUTINE
210 B=INKEY$:IF POINT(X,Y)=0 THEN SET(X,Y):RESET(X,Y) ELSE RESET(
  X,Y):SET(X,Y)
220 IF B="X" THEN 3000
230 GOSUB 2000:SET(X,Y):GOTO 210
300 REM ERASE ROUTINE
310 B=INKEY$:IF POINT(X,Y)=0 THEN SET(X,Y):RESET(X,Y) ELSE RESET
  (X,Y):SET(X,Y)
320 IF B="X" THEN 3000
330 GOSUB 2000:RESET(X,Y):GOTO 310
400 REM MOVE ROUTINE
410 B=INKEY$:IF POINT(X,Y)=0 THEN SET(X,Y):RESET(X,Y) ELSE RESET(
  X,Y):SET(X,Y)
420 IF B="X" THEN 3000
430 GOSUB 2000:GOTO 410
500 REM RECORD ROUTINE
```

```
510 N=0:FOR X=0 TO 127
520 FOR Y=0 TO 47
530 IF POINT(X,Y)=-1 THEN X(N)=X:Y(N)=Y:N=N+1
540 NEXT:NEXT:INPUT"HIT ENTER WHEN RECORDER READY":XS
550 PRINT#-1,N:FOR I=0 TO N STEP 5:PRINT#-1,X(I),Y(I),X(I+1),Y(I+
  1),X(I+2),Y(I+2),X(I+3),Y(I+3),X(I+4),Y(I+4):NEXT
600 INPUT"PREPARE RECORDER TO ENTER DATA":XS:REM PRINT ROUTINE
610 INPUT#-1,N
620 FOR I=0 TO N STEP 5:INPUT#-1,X(I),Y(I),X(I+1),Y(I+1),X(I+2),Y
  (I+2),X(I+3),Y(I+3),X(I+4),Y(I+4):NEXT
630 CLS:FOR I=0 TO N:SET(X(I),Y(I)):NEXT
640 GOTO 200
2000 IF B="U" THEN Y=Y+1 :REM UP
2010 IF B="D" THEN Y=Y-1 :REM DN
2020 IF B="R" THEN X=X+1 :REM RIGHT
2030 IF B="L" THEN X=X-1 :REM LEFT
2040 IF X<0 THEN X=0:RETURN
2050 IF X>127 THEN X=127:RETURN
2060 IF Y<0 THEN Y=0:RETURN
2070 IF Y>47 THEN Y=47
2080 RETURN
3000 REM EXECUTIVE ROUTINE
3010 B=INKEY$
3020 IF B="D" THEN 200:REM DRAW ROUTINE
3030 IF B="E" THEN 300:REM ERASE ROUTINE
3040 IF B="M" THEN 400:REM MOVE
3050 IF B="R" THEN 500:REM RECORD
3060 IF B="P" THEN 600:REM PRINT
3070 GOTO 3010
```

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- create, add to or delete field records

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press U (Up), D (Down), L (Left), or R (Right) while using the draw, erase, or move parts of the program. In this instance we have entered the subroutine from the draw routine. We now look to see if B equals any of the four control letters.

If a U was depressed, one is subtracted from the value of Y, indicating a graphic block one higher than the one currently indicated by the value of X and Y. If a D had been depressed, one would be added to Y. Similarly, if L is depressed, one is subtracted from X, while one is added to X if R was depressed.

In statements 2040 through 2070, if X or Y has been assigned unacceptable (off the screen) values, a value is reassigned for the appropriate screen edge. Even if you keep hitting L after the block has moved all the way to the left the program will not crash.

When control returns from the subroutine, the graphic block for the new value of X and Y is turned on and we go to line 210

to do it all over again. We can now turn on graphics blocks or draw until an X is depressed.

Five Routines

Whenever an X is hit the program branches to 3000. B is again set equal to INKEY\$ and the user can hit D, E, M, R or P to indicate which routine is desired. This causes branching to the draw, erase, move, record, or print routines.

The erase routine is in statements 300-330 and is identical to the draw routine except when returning from the subroutine the graphic block is turned off rather than on. This is also true of the move routine except that when returning from the subroutine, the graphic block is not turned on or off, but the blinking block is moved.

The record routine (500-550) scans the entire screen and where a block is turned on, the values of X and Y are saved as pairs in a series of X(N), and Y(N). The user is told to set up the tape recorder and the Xs and

Ys are recorded. I have arbitrarily written the PRINT\$-1 statement to record five pairs at a time. If you write it to print 10 or 20, the recording and subsequent reading from the tape is much faster.

The print routine reads values of X and Y from tape, turns on the corresponding graphic blocks and branches to statement 200 for more drawing.

After the program is loaded and run you will see a small blinking block at the upper left of the screen. If you want to begin drawing there, just hit D or R and a line is drawn down or to the right. Use D, L, R and U to direct this blinking block of light.

If you decide to erase something just hit X and the blinking will stop. Hit E and the blinking resumes, but now when you use U, D, L and R, your lines disappear as the blinking block moves over them.

If you want to move to another part of the screen, just hit X. When the blinking stops, hit M

and the blinking resumes. Now as you use the direction letters the blinking block moves but nothing will be drawn or erased.

You can experiment, correct mistakes and go back and try again until you have the drawing you want. Hit R. There will be a long pause while the screen is scanned and X and Y values are saved. Then you will get a prompt to set up the recorder to record values. When you hit enter, recording begins. The program will continue—allowing you to enter what you have from tape.

While this program is quite simple, it provides a lot of fun drawing on the screen, and you will probably find yourself amazed at its versatility. When you have a figure that you would like to use, you can break from the program after recording values on tape and get a print-out in the immediate mode of the existing X-Y pairs. These values can then be used in another program to draw the image you desire. ■

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Along with the OCTUG Newsletter, yours is the best I've seen for important info on the TRS-80. ATLANTA, GA

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After a few weeks of familiarization with my TRS-80 and Radio Shack's Level II

BASIC, I found my programs getting longer than the 16 lines that the CRT would accommodate at one time. Listing and relisting to see various parts of the program during debugging became tedious. I soon found

myself making repeated trips to the neighborhood Radio Shack store to get my programs listed on their line printer.

This couldn't go on. After all, I did have that model 33 Teletype out in the garage if I could figure out how to hook it up. I found several Teletype interface kits on the market in the \$75-\$120 price range, but having barely squeaked the TRS-80 into the family budget and being an avid home-brewer, I decided to build my own interface. The resulting circuit required only five parts.

Interfacing Techniques

The usual method of interfacing a Teletype to the TRS-80 is shown in Fig. 1. This method requires a UART that accepts data in parallel form from the CPU data bus, adds the proper start and stop bits and sends the data out in serial form at a rate determined by an external baud rate generator. This method is fast and efficient and, if interrupt driven, can even let the processor do something else while the UART is serializing the data. For parts, it requires an address decoder circuit, a UART, bus buffers, a baud rate generator IC and some form of TTL-to-current-loop interface circuit. Also, a software routine is required to set up the internal

functions of the UART and then continuously route data to the UART.

Another method, shown in Fig. 2, merely writes a bit at a time out to a location at a decoded I/O port. This method requires hardware only for decoding the port address and interfacing to the current loop of the printer. While this method requires less hardware than the first method, it does require more software. In addition, the processor is tied up the whole time doing the actual output of bits. The software routine must take the data, add the proper start and stop bits and then write the bits out to the I/O port one at a time at a rate determined by a software timing loop.

Since the LPRINT routine in the TRS-80 ROM is non-interrupt driven, and since I had enough half-finished construction projects in process already, it was obvious that the simplest hardware interface was the best.

Remembering that the CPU decodes port FF for cassette input/output and motor control, I studied the schematic for any unused bits I might use in that port. Eureka! . . . there were several. I decided to use bit D5 for my serial output line. Since the port was already decoded, the need for external address

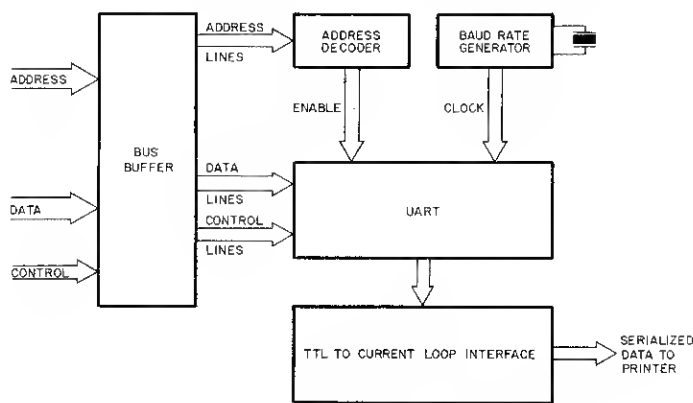


Fig. 1. Hardware printer interface block diagram.

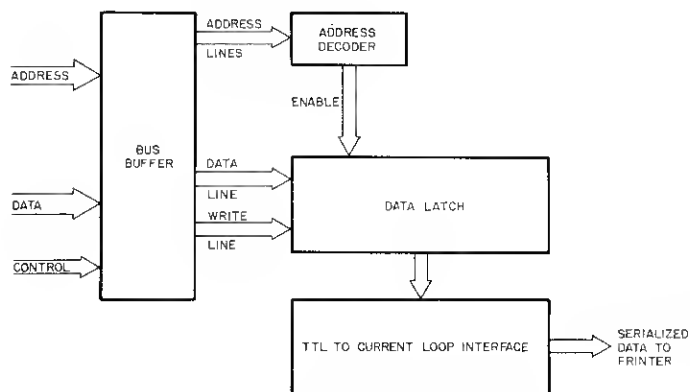


Fig. 2. Alternate interface block diagram.

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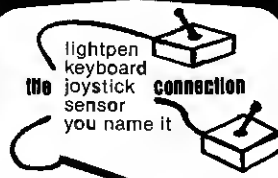


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decoding and bus-buffering hardware was eliminated. Now all I had to provide was a data latch to store the bit and a current loop interface.

Fig. 3 shows how I accomplished this task with only five parts. The 74LS175, which I will refer to as Z59A, serves as the data latch. Although it is capable of latching four bits, I used only one section to latch bit D5. Resistors R1 and R2 and transistor Q1 are used to buffer the output of the latch and provide approximately 20 mA of drive current for the optical isolator.

The 4N35 optical isolator provides about 2500 volt isolation between the outside world current loop and my precious CPU—a nice thing to have when you accidentally hook the loop supply up wrong! The outputs of the 4N35 are connected to two unused pins on the video output connector. These pins then connect to the 20 mA printer loop.

Software

Now that I had the hardware capability to enable or disable current flow in an external loop, I needed a program to turn this current flow on and off according to the ASCII bit pattern required by the printer. The flowchart of such a program is shown in Fig. 4.

Since the normal logic state of the bits in port FF is 0, I used the logic 0 to represent the MARK, or current-flowing condition, in the loop. A logical 1 written to the output port represents the SPACE condition and disables current flow in the loop. The flowchart describes the program fairly well, so I will only touch on a few of the high points.

The LPRINT and LLIST routines in ROM never output a line-feed code since they assume the printer to have automatic line feed on the carriage return. Since my machine does not have that feature, I included a routine to output a line feed whenever a carriage return was output by the ROM.

Also included is a character-counter routine set to limit line length to approximately 70 characters. Memory location

16424 is used as the counter. Every time a character is output, this memory location is incremented. When it reaches 70, a carriage return and line feed are printed. The character counter is set to zero initially and also every time a carriage return-line feed is output.

Because the LPRINT and LLIST routines were written to operate with Centronics printers, they examine the line printer address, memory location 14312, for a READY bit to be set before they output the next character. Therefore, the Teletype program writes a fake READY bit to this address to

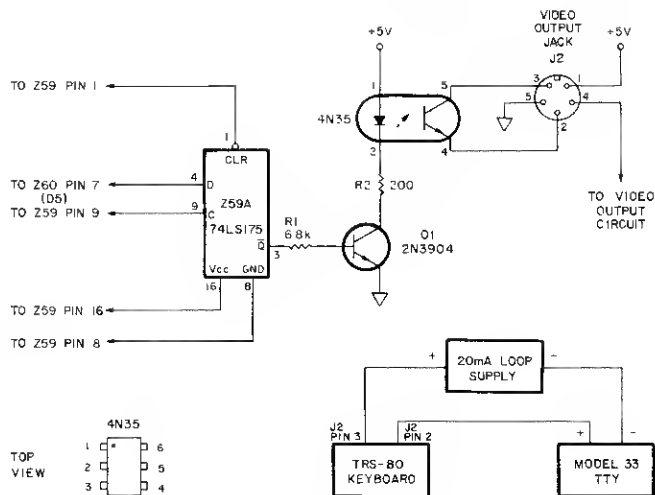


Fig. 3. TTY interface schematic.

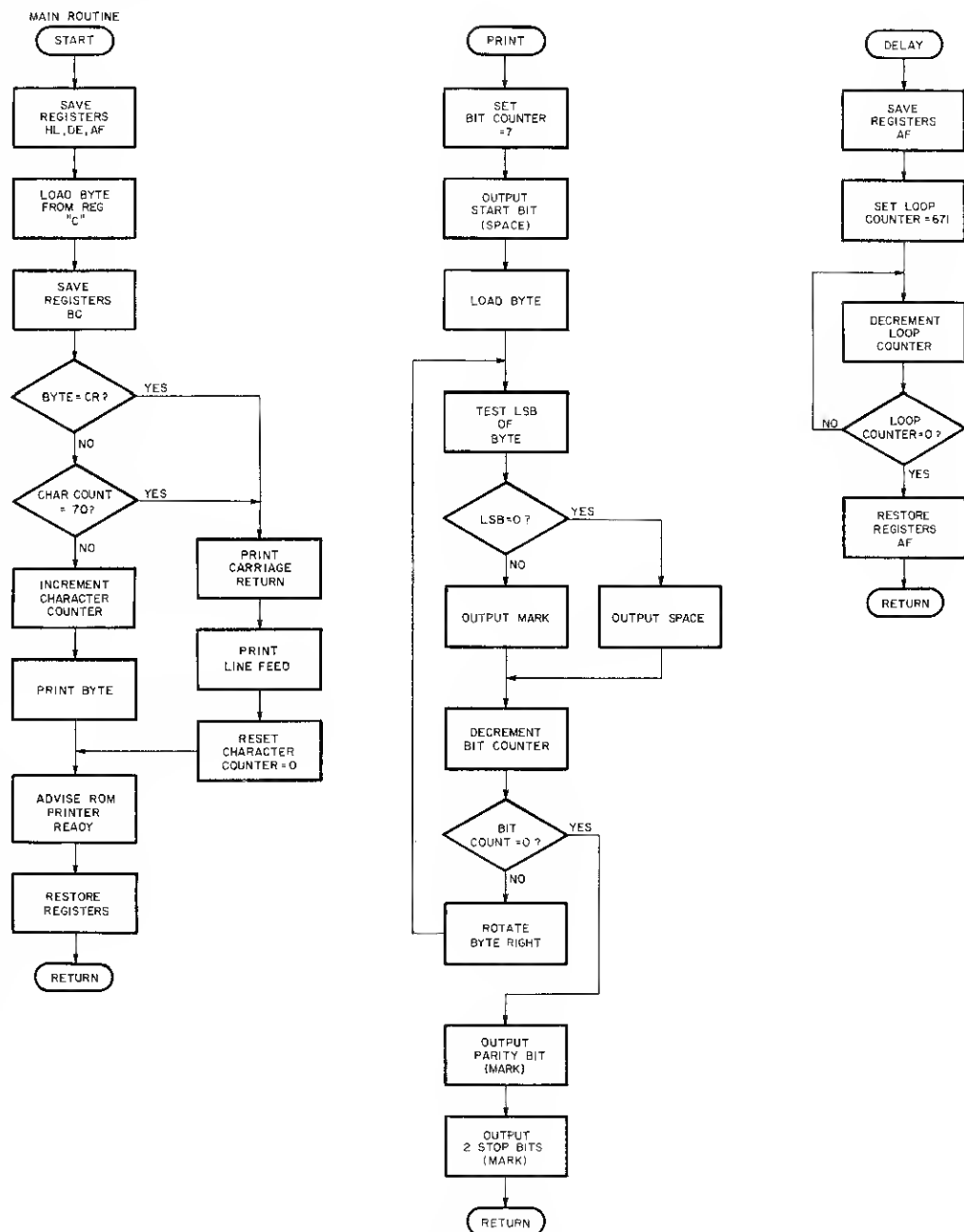


Fig. 4. Software flowchart.

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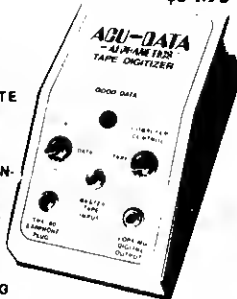
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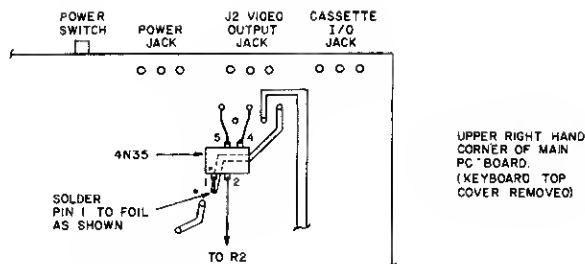


Fig. 5. 4N35 installation on main PC board.

enable a character output by the ROM routines.

The section of code labeled PRINT in Fig. 4 is a part of the program that serializes the data to be output. It first holds the output in SPACE condition for one bit time to simulate the start bit. Then the program samples each bit in register H and outputs a logic 0 (MARK) or a logic 1 (SPACE) to bit D5 of port FF, depending on the bit status of the byte being printed. After all bits have been sampled, the program holds the output in MARK condition for three bit times—one for an even parity bit and two for two stop bits—before executing a RETURN to ROM.

The part of the program labeled DELAY determines the baud rate of the output. The DELAY loop furnishes approximately 13.56 microseconds' delay each time it is executed. Therefore, for the 9.1 ms bit time required for a 110 baud printer this delay loop is executed 671 times.

Installation

To make the required modifications, first place the keyboard face down on a soft surface and remove the six Phillips-head screws holding the case together. Note that there are three different sizes, so note where each size goes. Next, holding the case together with your hands, place the keyboard right side up on your work surface and gently lift off the top cover.

Notice that the keyboard is connected to the main PC board by a delicate, white, flat ribbon cable located on the lower left edge of the keyboard PC board. Trying not to flex this cable too much, pull the key-

board away from the main PC board and hold it vertically while removing the five little white-plastic spacers that are on the PC board and lift the entire assembly out of the bottom half of the case. Holding the keyboard against the main PC, turn the whole assembly over and place it so the IC numbers can be read with the keyboard face down.

Locate Z59 in the lower left area. Take a new 74LS175 IC and bend all but the four corner pins outward. Place this IC, Z59A, piggyback style on top of Z59. Solder the four corner pins of Z59A to their counterparts on Z59. Use as little heat and solder as possible to avoid

overheating the ICs or causing shorts.

Now cut one of the leads of both R1 and R2 and the base and collector leads of Q1 to a length of about 1/4 inch. Solder the short lead of R1 to the base lead of Q1. Similarly, solder the short lead of R2 to the collector of Q1.

Now turn Q1 upside down and solder its emitter lead to Z59, pin 8. Run a short piece of insulated wire from Z59A, pin 4, to Z60, pin 7. Make sure that all unconnected leads of Z59A are bent away from Z59 and are not touching anything else. Solder one end of a long piece of insulated wire to the unconnected lead of R2.

Now take a good look at what you have done so far. Make sure that the transistor and resistors are secure and that their leads are not touching anything that they are not supposed to touch.

Once satisfied, turn the PC boards over and mount them back in the lower half of the case. Before putting the top cover back on, do the following: Take a 4N35 IC and cut off pins

3 and 6. Then, referring to Fig. 5, solder pin 1 of the 4N35 to the trace shown. Solder the end of the hookup wire still dangling to pin 2 of the 4N35. Solder pins 4 and 5 of the 4N35 to short pieces of hookup wire, which should then be soldered to the video connector pins shown.

The modification is now complete. Reassemble the rest of the case. Connect the Teletype and loop supply as shown. Upon power-up, set MEMORY SIZE to 32566 for a 16K machine or 20277 for a 4K model.

Enter and run the TTY program. When run is typed, the BASIC program will poke the TTY program into high memory and then destroy itself. From then on, the LLIST and LPRINT statements should work using the Teletype as a line printer.

Conclusion

For those who are not afraid to modify their prized equipment, this modification is convenient and works well with any program utilizing the line printer control block set up in RAM by the Level II ROM. Since

```
----- TTY PROGRAM FOR 4K LEVEL II -----
SET MEMORY SIZE TO 20277
```

```
10 CLS:INPUT"DO YOU WANT CRT ECHO ON LPRINT ";A$: IF A$="Y" OR A$="N" THEN IF
  A$="Y" THEN POKE 16422,54 ELSE POKE 16422,58 ELSE 10
20 POKE 16423,79: POKE 16424,0 : FOR I= 20278 TO 20423
30 READ BYTE
40 POKE 1,BYTE
50 NEXT
60 DATA 121,205,51,0,229,213,245,97,197,124,87,254,13,194,86,79,205,136,79,38
65 DATA 10,205,136,79,62,0,50,40,64,195,126,79,58,40,64,254,70,194,115,79,205
70 DATA 136,79,38,13,205,136,79,38,10,205,136,79,62,0,50,40,64,195,126,79,58
75 DATA 40,64,60,50,40,64,98,205,136,79,62,63,50,232,55,193,241,209,225,201,6
80 DATA 7,62,48,211,255,205,188,79,124,103,203,71,202,157,79,62,16,195,159,79
85 DATA 62,48,211,255,205,188,79,5,202,174,79,124,203,31,195,146,79,62,16,211
90 DATA 255,205,188,79,205,188,79,205,180,79,201,245,17,159,2,27,122,179,194
95 DATA 192,79,241,201
97 NEW
99 END
```

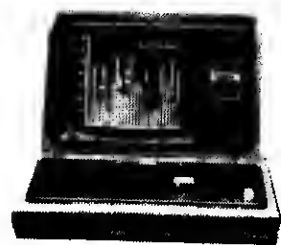
```
----- TTY PROGRAM FOR 16K LEVEL II -----
SET MEMORY SIZE TO 32566
```

```
10 CLS:INPUT"DO YOU WANT CRT ECHO ON LPRINT ";A$: IF A$="Y" OR A$="N" THEN IF
  A$="Y" THEN POKE 16422,55 ELSE POKE 16422,59 ELSE 10
20 POKE 16423,127: POKE 16424,0: FOR I = 32567 TO 32712
30 READ BYTE
40 POKE 1,BYTE
50 NEXT
60 DATA 121,205,51,0,229,213,245,97,197,124,87,254,13,194,87,127,205,137,127,38
65 DATA 10,205,137,127,62,0,50,40,64,195,127,127,58,40,64,254,70,194,116,127,205
70 DATA 137,127,38,13,205,137,127,38,10,205,137,127,62,0,50,40,64,195,127,127,58
75 DATA 40,64,60,50,40,64,98,205,137,127,62,63,50,232,55,193,241,209,225,201,6
80 DATA 62,48,211,255,205,189,127,124,103,203,71,202,158,127,62,16,195,160,127,62
85 DATA 48,211,255,205,189,127,5,202,175,127,124,203,31,195,147,127,62,16,211,255
90 DATA 205,189,127,205,189,127,205,189,127,201,245,17,159,2,27,122,179,194,193
95 DATA 127,241,201
97 NEW
99 END
```

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A final note: As I was going over the program for the 50th

time in preparation for this article, I noticed that by adding four more bytes to the beginning of the program I could have the CRT echo what was being LPRINTed. I have included them in the TTY programs. These bytes are a call to

a subroutine located in ROM at hex location 0033, which displays the character on the CRT. ■

References

"TRS-80 Machine-Language

Programmer's Handbook," Tahl Milburn.

"Radio Shack TRS-80 Editor/Assembler Operation and Reference Manual," Radio Shack, 1978.

"TRS-80 Technical Manual," Radio Shack, 1978.

7F3B E5	PUSH	HL	7F92 7C	LD	A,H
7F3C D5	PUSH	DE	7F93 67	LD	H,A
7F3D F5	PUSH	AF	7F94 CB47	BIT	0,A
7F3E 61	LD	H,C	7F96 CA9E7F	JP	Z,SPACE
7F3F C5	PUSH	BC	7F99 3E00	LD	A,0
7F40 7C	LD	A,H	7F9B C3A07F	JP	BIT
7F41 57	LD	D,A	7F9E 3E20	LD	A,32
7F42 FE0D	CP	0DH	7FA0 D3FF	OUT	(0FFH),A
7F44 C2577F	JP	NZ,EOL	7FA2 C0BD7F	CALL	DELAY
7F47 CD897F	CALL	PRINT	7FA5 05	DEC	B
7F4A 260A	LD	H,0AH	7FA6 CAAF7F	JP	Z,DONE
7F4C CD897F	CALL	PRINT	7FA9 7C	LD	A,H
7F4F 3E00	LD	A,0	7FAA CB1F	RR	A
7F51 322840	LD	(4028H),A	7FAC C3937F	JP	LOOP
7F54 C37F7F	JP	EXIT	7FAF 3E00	LD	A,0
7F57 3A2840	LD	A,(4028H)	7FB1 D3FF	OUT	(0FFH),A
7F5A FE46	CP	70D	7FB3 C0BD7F	CALL	DELAY
7F5C C2747F	JP	NZ,MIN	7FB6 C0BD7F	CALL	DELAY
7F5F CD897F	CALL	PRINT	7FB9 C0BD7F	CALL	DELAY
7F62 260D	LD	H,0DH	7FBC C9	RET	
7F64 CD897F	CALL	PRINT	7FBD F5	PUSH	AF
7F67 260A	LD	H,0AH	7FBE 119F02	LD	DE,671D
7F69 CD897F	CALL	PRINT	7FC1 1B	DEC	DE
7F6C 3E00	LD	A,0	7FC2 7A	LD	A,D
7F6E 322840	LD	(4028H),A	7FC3 B3	OR	E
7F71 C37F7F	JP	EXIT	7FC4 C2C17F	JP	NZ,DLOOP
7F74 3A2840	LD	A,(4028H)	7FC7 F1	POP	AF
7F77 3C	INC	A	7FC8 C9	RET	
7F78 322840	LD	(4028H),A	0000	END	
7F7B 62	LD	H,D	00000 TOTAL ERRORS		
7F7C CD897F	CALL	PRINT	DLOOP 7FC1		
7F7F 3E3F	LD	A,63D	DONE 7FAF		
7F81 32E837	LD	(37E8H),A	BIT 7FA0		
7F84 C1	POP	BC	SPACE 7F9E		
7F85 F1	POP	AF	LOOP 7F93		
7F86 D1	POP	DE	DELAY 7FBD		
7F87 E1	POP	HL	OUT 7F7C		
7F88 C9	RET		MIN 7F74		
7F89 0607	LD	B,7D	EXIT 7F7F		
7F8B 3E20	LD	A,32D	PRINT 7F89		
7F8D D3FF	OUT	(0FFH),A	EOL 7F57		
7F8F C0BD7F	CALL	DELAY	TTY 7F3B		

Assembled program.

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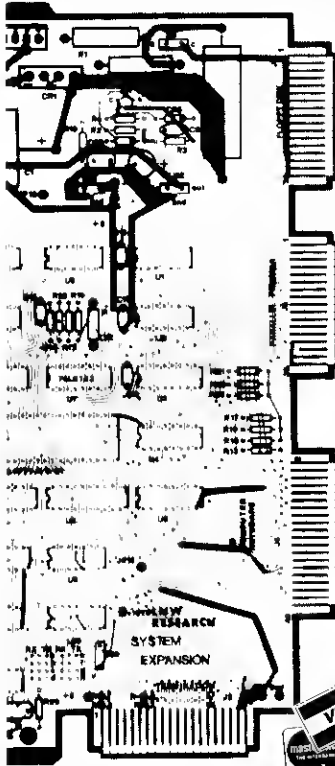
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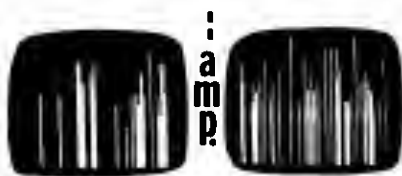
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Going through my back issues of *Kilobaud*, I reread the article in the April, 1978 issue on 3D Tic-Tac-Toe for the North Star BASIC. I decided to convert it for the TRS-80.

It was immediately apparent that the conversion would mean changing the graphics format to a 16 line screen. Since it is annoying to have the computer blank the screen to redraw the board while you are trying to analyze a complex arrangement, I decided to draw a new layout.

Using X and O gave me a chance to try POKEing instructions for graphics. Fortunately, the TRS-80 graphic characters enabled me to form a very acceptable X and O with only two POKE statements each.

Drawing the Board

I laid out the four boards on a TRS-80 graphics worksheet. When I thought I had a nice balance, with room for responses and playing aids, I was

ready to write the display portion of the program.

Since I would only draw the boards one time for each game and the symmetrical nature of the boards was so obvious, I chose a simple FOR-NEXT routine to draw the boards. The top of the screen was used for information, and the bottom for alterable text describing moves.

I used the edit mode to change lines in the graphic portion of the resident program and gave it a run. I liked the looks of the presentation, so I turned my attention to making the game run.

The array used to set up the possible winning combinations was two dimensional with 304 elements. After deciphering the intent of the listed statements, it was fairly easy to edit the lines so the TRS-80 could construct the required array.

After a few false starts, I managed to get the game to run. The computer took just over four minutes to make its first move, but it did place its O correctly. I was grateful for that. I continued play and about 45 minutes later, while on the verge of mak-

ing an excellent move, I was rudely jolted by an "I WON WITH BOARD 3, POSITION 11". In checking carefully the supposed winning combination, I found that I had been truly "snookered".

That hooked me. I knew I was in for a prolonged altercation with this crafty machine. Furthermore, I didn't want each game to be over an hour long, so I set to work increasing its speed.

Increasing the Speed

There are 64 squares on the four boards and you need four-in-a-row for a win. This results in 76 possible combinations for a win. When you make a move, the computer has to check all possible combinations to determine if you won, and, if not, what the board now contains as threats to win. The computer then sorts through all 76 possible combinations of wins for each of the 64 squares resulting in 19,456 comparisons before it can go on with its move.

This is in addition to the evaluation for your move. With close to 20,000 comparisons to

be made, it is not surprising that the computer moves slowly.

Since there are only seven combinations that involve square (1,1) and only four combinations that involve square (1,2), it seemed like a waste of time to have to look through all 76 combinations just to find the seven or four combinations required.

There are sixteen squares that are involved in seven winning combinations and 48 squares that are involved in four winning combinations. By allowing the computer to access only the small set of winning combinations for each box, the number of comparisons could be reduced to only 294.

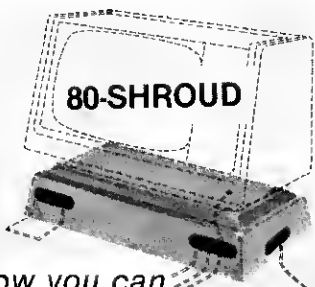
Another array was added to the program calling all 294 winning combinations which the computer searched in order. With this modification, the run time for the computer to move was reduced to less than 25 seconds.

I added some instructions and a score keeping function and converted the appropriate variables to integer form to reduce memory requirements. I

Program Listing.

```
5 CLS
6 GOSUB 4000
7 DEFINT A-Z
9 CLS:PRINT#520,"PLEASE WAIT A SECOND WHILE I GET READY"
10
10 DIM S(64),W(3,76),V(76),D1(64,7),K(64)
20 FOR A=1 TO 10:FOR A1=0 TO 3:READ W(A1,A):NEXT A1,A
30 FOR A=1 TO 3:A1=A*10:FOR A2=1 TO 10:FOR A3=0 TO 3
40 W(A3,A1+A2)=W(A3,A2)+(16*A):NEXT A3,A2,A
50 FOR A=41 TO 56:FOR A1=0 TO 3
60 W(A1,A)=(A1*16)+A-40:NEXT A1,A
```

```
70 FOR A=57 TO 76:FOR A1=0 TO 3:READ W(A1,A):NEXT A1,A
72 DATA 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,1,5,9,13,
2,6,10,14
74 DATA 3,7,11,15,4,8,12,16,1,6,11,16,4,7,10,13,1,22,43,
64
76 DATA 5,22,39,56,9,26,43,60,13,26,39,52,2,22,42,62,14,
26,38,50
78 DATA 3,23,43,63,15,27,39,51,4,23,42,61,8,23,38,53,12,
27,42,57,16,27,38,49
83 DATA 1,21,41,61,1,18,35,52,4,19,34,49,4,24,44,64
```



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```

84 DATA13,25,37,49,13,39,47,64,16,31,46,61,16,28,40,52
85 GOSUB5000
86 FOR A=1 TO 64:S(A)=0:V(A)=0:NEXTA:FORA=65TO76:V(A)=0
:NEXT A
87 GOSUB7000:GOSUB 6000
90 CLS:GOSUB 1000
91 IF C=1 THEN 300
95 PRINT@835,"YOUR BOARD & POSITION";:INPUT A1,A2
96 PRINT@863,"
97 IF (A1=0) AND (A2=0) THEN 9000
98 GOSUB2000
100 A=((A1-1)*16)+A2:Z1=Z+16*A1+128*R
105 IF A>64 OR A<1 THEN PRINT@857," ILLEGAL M
OVE":GOTO 95
110 IF S(A)<>0 THEN PRINT@857," YOU CAN'T MOVE THE
RE":GOTO 95
120 S(A)=1
125 POKE Z1+15360,153:POKE Z1+15361,166
190 M5=0:FOR A=1 TO 76
192 A2=W(0,A):A3=W(1,A):A4=W(2,A):A5=W(3,A)
194 V(A)=S(A2)+S(A3)+S(A4)+S(A5)
196 IF V(A)=4 THEN B1=A:GOTO410
198 IFV(A)=15 THEN M5=A
199 NEXT A:IF M5<>0 THEN 365
204 M3=-1:A0=0
205 FOR Q=1 TO 64:A=K(Q):IF S(A)<>0 THEN 230
206 N=7:IF Q>=17 THEN N=4
207 M2=0:A8=A8+1
208 FOR D=1 TO N:A1=D1(Q,D)
210 B6=V(A1)
212 IF B6=3 THEN M4=A:GOTO 390
214 IF B6=0 THEN 222
216 IF B6=1 OR B6=5 THEN M2=M2+1
218 IF B6=2 THEN M2=M2+2+P+((RND(2)-1)*100)
220 IF B6=10 THEN M2=M2+12
222 NEXT D
224 IF M2>=18 AND M2<=19 THEN M2=M2-18
226 IF M2=100 AND M2<=199 THEN M2=M2-100
228 IF M2>M3 THEN M3=M2:M4=A
230 NEXT Q
250 IF A0=0 THEN 9010
260 GOTO 390
365 FOR A1=0 TO 3:A6=W(A1,M5):B1=M5:IF S(A6) = 0 THEN
M5 = A6:GOTO370
367 NEXT A1
370 A1=INT((M5-1)/16)+1:A2=M5-((A1-1)*16)
380 PRINT@835,"I WON WITH BOARD";A1;"POSITION";A2:C=C+1
:H=H+1:GOSUB2000:GOSUB3000
384 FOR X=1 TO 20
385 FOR A=0 TO 3:M5=W(A,B1):A1=INT((M5-1)/16)+1:A2=M5-((
A1-1)*16):GOSUB2000:GOSUB8000:GOSUB0100:NEXTA:RETU
RN
386 NEXTX
387 GOTO415
390 S(M4)=5:G=0
392 A1=1+INT((M4-1)/16):A2=M4-((A1-1)*16)
400 PRINT@865,"I WANT BOARD";A1;"POSITION";A2:GOSUB200
0:GOSUB3000:PRINT@857," ":GOTO95
410 PRINT@835,"YOU WON !! ":J=J+
1:H=H+1
411 FOR X=1 TO 20:GOSUB412:NEXTX:GOTO415
412 FORA=0 TO 3:M5=W(A,B1):A1=INT((M5-1)/16)+1:A2=M5-((
A1-1)*16):GOSUB2000:GOSUB8000:GOSUB0100:NEXTA:RETU
RN
415 CLS:PRINT"WE HAVE PLAYED ";H;"GAMES":PRINT:PRINT"WE
'VE HAD ";H-C-J;"DRAWS":PRINT@320,"YOU HAVE WON";J
;"GAMES."; " "; "I HAVE WON";C;"GAMES.":INPUT"DO
YOU WANT TO PLAY AGAIN";A$
420 IF LEFT$(A$,1)="Y"THEN 86
425 PRINT@280,"THANK YOU":END
1000 FOR Y=19 TO 31 STEP 6:FOR X=2 TO 31
1100 SET(X,Y):SET(X+32,Y):SET(X+64,Y):SET(X+96,Y):NEXTX
,Y
1105 FORX=8 TO 24 STEP 8:FOR Y=15 TO 35
1107 SET(X,Y):SET(X+32,Y):SET(X+64,Y):SET(X+96,Y):NEXTY
,X
1110 PRINT@2,"YOUR MOVES ARE ";:POKE 15377,153:POKE1537
8,166
1120 PRINT@130,"MY MOVES ARE";:POKE 15505,183:POKE 1550
6,187
1125 PRINT@31,"ALL BOARD 1 5 9 13";
1127 PRINT@95,"POSITIONS ARE 2 6 10 14";
1130 PRINT@174,"3 7 11 15";
1135 PRINT@238,"4 8 12 16";
1140 PRINT@773,"BOARD 1 BOARD 2 BOARD 3
BOARD 4"
2000 IF A2<5 THEN Z=177:R=A2
2010 IF A2>=5 AND A2<9 THEN Z=181:R=A2-4
2020 IF A2>=9 AND A2<13 THEN Z=185:R=A2-8
2030 IF A2>=13 THEN Z=189:R=A2-12
2040 RETURN
3000 Z1=Z+16*A1+128*R
3005 IF Z1>1000 THEN STOP
3010 POKE Z1+15360,183
3020 POKE Z1+15361,187:RETURN
4000 PRINT@280,"3-D TIC-TAC-TOE"
4010 PRINT@580,"":INPUT"DO YOU WANT INSTRUCTIONS";A$
4020 IF LEFT$(A$,1)="Y" THEN4050
4030 RETURN
4050 CLS:PRINT"THIS GAME WILL REQUIRE THE UTMOST SKILL.
YOU CAN WIN"
4052 PRINT"WITH 4 SQUARES IN A ROW --ACROSS, DOWN AND
DIAGONALLY-- ON"

```

```

4055 PRINT"ANY BOARD. YOU CAN ALSO WIN WITH 4 SQUARES
IN A ROW, FROM"
4060 PRINT"BOARD TO BOARD --ACROSS, DOWN AND DIAGONALLY
FOR EXAMPLE,"
4062 PRINT"ANY SET OF IDENTICAL MOVES ON EACH OF THE 4
BOARDS IS A WIN;"
4065 PRINT"ALSO, A TOP ROW SQUARE ON BOARD 1 COMBINED W
ITH THE SAME"
4070 PRINT"COLUMN SQUARE IN THE SECOND ROW ON BOARD 2,
ETC. IS A WIN."
4072 PRINT"DIAGONALS THROUGH THE CUBE AT EACH LEVEL OR
ACROSS LEVELS ARE"
4074 PRINT"ALSO PERMITTED. FOR A DRAW, ENTER 0,0.":PRI
NT
4076 PRINT"THE COMPUTER WILL TRY TO BLOCK YOU AND ALSO
TRY TO WIN ITSELF."
4078 PRINT"IF THE COMPUTER MOVES FIRST, IT WILL MAKE A
RANDOM MOVE FIRST."
4080 PRINT"BE SURE TO PUT A COMMA BETWEEN YOUR ENTRIES.
"
4090 PRINT:PRINT"GOOD LUCK--YOU'LL NEED IT!";
4100 INPUT" PRESS ENTER TO BEGIN.":B$
4210 GOTO9
5000 FOR Q=1 TO 16:FOR D=1 TO 7:READD1(Q,D):NEXT D,Q
5010 FOR Q=17 TO 64:FOR D=1 TO 4:READD1(Q,D):NEXT D,Q
5012 FOR Q=1 TO 64:READ K(Q):NEXTQ
5015 RETURN
5020 DATA1,5,9,41,57,69,70,1,0,10,44,65,71,72,4,5,10,54
,60,73,74
5030 DATA4,8,9,56,68,75,76,31,35,39,41,68,71,73,31,38,4
0,44,60,70,76
5040 DATA34,35,40,54,65,69,75,34,38,39,56,57,72,74,12,1
6,19,46,57,58,61
5050 DATA12,17,20,47,63,65,66,13,16,20,50,59,60,62,13,1
7,19,51,64,67,68
5060 DATA22,26,29,46,62,66,68,22,27,30,47,58,60,64
5070 DATA23,26,30,50,61,65,67,23,27,29,51,57,59,63
5080 DATA1,6,42,61,1,7,43,63,2,5,45,58,2,6,9,46
5090 DATA2,7,10,47,2,8,48,66,3,5,49,59,3,6,10,50
5100 DATA3,7,9,51,3,8,52,67,4,6,53,62,4,7,55,64
5110 DATA11,15,19,41,11,16,42,70,11,17,43,71
5120 DATA11,18,20,44,12,15,45,69,12,18,48,72,13,15,49,7
3
5130 DATA13,18,52,76,14,15,20,54,14,16,53,74,14,17,55,7
5
5140 DATA14,10,19,56,21,25,29,41,21,26,42,71,21,27,43,7
0
5150 DATA21,28,30,44,22,25,45,73,22,28,40,76,23,25,49,6
9
5160 DATA23,28,52,72,24,25,30,54,24,26,53,75,24,27,55,7
4
5170 DATA24,28,29,56,31,36,42,62,31,37,43,64,32,35,45,6
6
5180 DATA32,36,39,46,32,37,40,47,32,38,48,50,33,35,49,6
7
5190 DATA33,36,40,50,33,37,39,51,33,38,52,59,34,36,53,6
1
5200 DATA34,37,55,63
5210 DATA1,4,13,16,49,52,61,64,22,23,26,27,38,39,42,43
5220 DATA2,3,5,6,7,8,9,10,11,12,14,15,17,18,19,20,21,24
,25,28,29,30,31,32
5230 DATA33,34,35,36,37,40,41,44,45,46,47,48,50,51,53,5
4,55,56,57,58,59,60,62,63
6000 CLS:INPUT"DO YOU WANT TO FLIP A COIN FOR WHO GOES
FIRST. I CAN DO IT FOR YOU.":A$
6010 IF LEFT$(A$,1)="Y" THEN 6050
6020 INPUT"O.K. DO YOU WANT TO GO FIRST";A$
6030 IF LEFT$(A$,1)="Y" THEN RETURN
6040 A1=RND(4):A2=RND(16):M4=A2+(A1-1)*16:G=1:RETURN
6050 F=RND(2):INPUT"DO YOU WANT HEADS OR TAILS";B$
6060 IF LEFT$(B$,1)="T" THEN 6100
6070 IF F=1 THEN PRINT"YOU WIN. YOU MOVE FIRST.":FOR X
=1 TO 1000:NEXT:RETURN
6080 PRINT"I WON THE TOSS. I'LL GO FIRST.":FOR X=1 TO
1000:NEXT:GOTO6040
6100 IF F=2 THEN PRINT"YOU WIN. YOU MOVE FIRST.":FOR X
=1 TO 1000:NEXT:RETURN
6110 PRINT"I WON THE TOSS. I'LL GO FIRST.":FOR X=1 TO
1000:NEXT:GOTO6040
7000 CLS:PRINT@256,"HOW DO YOU WANT ME TO PLAY?"
7010 PRINT:PRINT"1. LIKE A (UGH) HUMAN "
7020 PRINT"2. LIKE AN AVERAGE COMPUTER"
7030 PRINT"3. LIKE A SUPER COMPUTER"
7040 PRINT:INPUT"ENTER 1, 2 OR 3";P
7050 IF P<1 THEN P=1
7060 IF P>3 THEN P=3
7070 P=P-1:RETURN
8000 Z1=Z+16*A1+128*R
8010 POKE Z1+15360,128
8020 POKE Z1+15361,128
8030 RETURN
8100 Z1=Z+16*A1+128*R:POKE Z1+15360,153
8150 POKE Z1+15361,166
8200 RETURN
9000 FORA=1 TO 64:IF S(A)=0 THEN 9500
9005 NEXTA
9010 PRINT@835,"IT'S A DRAW ! ":FOR X=1 T
O 2000:NEXTX:H=H+1:GOTO415
9500 PRINT@857," THAT'S NOT A DRAW !":GOTO 95

```

added some lines of programming to allow a player to determine who goes first, either by chance (flip of the computer's coin), or by choice.

If the computer moves first, it picks the opening square at random.

I also added the feature that flashes the four winning squares of either victor.

Modifications

After playing several games, a few glitches showed up and I had to modify the algorithm. I came up with a good modification, but then I couldn't beat it, although I did manage a draw. Although I haven't achieved one since.

Since a draw would "hang up" the program, I added two subroutines to handle it. If you moved first, the computer would fill in the last square, so I added the feature of entering (0,0) for board and position to allow you to call a draw.

To prevent abuse, however,

such as declaring a draw when in danger of losing, I added a check for open squares. If there is an open square, you cannot call a draw. If the computer has moved first, when you've entered the last square, it will find no place to move and will declare a draw itself.

Now, I was ready for one more change. I gave the computer the ability to play three different levels of difficulty. I also included a random factor that will occasionally (50 percent of the time) allow the computer to make only a good move, not necessarily the best move.

All in all, this project has given me an opportunity to learn more about Level II BASIC through practical application. Now, as a result of my efforts, I have gained much valuable experience and have a first class game program for myself. ■

References

Roehrig, Joseph; "3D-TIC-TAC-TOE"; April 1978 *Kilobaud* pp. 66-69

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Disaster Saver

Bob Brooks
465 N. Encinitas
Monrovia, CA 91016

his local Radio Shack store with two complete systems, disk drives, printers et al, so that he could do his payroll, accounting, order processing and inventory control. To help him program his TRS-80 the Radio Shack store sold him *TTL Cookbook*, *TV Typewriter* and *8080 Bug Book*.

I was called in through a

friend of a friend.

"HELP—I bought all this stuff, plugged it in, and it just sits there and does absolutely nothing!"

Got It to Work

I took one system home and got it to work. But when I keyed in programs, I had to SAVE every 10 lines or so, because they randomly rebooted the operating system, bombing the program.

When I did get a complete program loaded, it blew-up before completion. Each and every time it blew-up, I walked away to cool off and maintain my sanity.

I happened to pass the refrigerator and soon noticed that it was always running, as were the garbage disposal, microwave oven and vacuum.

I brought out my scope, meter and variac. The regulation and spike protection seemed adequate, but the filter caps in the American Flyer type power supplies were just not large enough to supply current during the momentary line drop caused by a motor start. And this was in my home, not the user's place of business, an industrial park.

The simple and obvious cure was a visit to the local surplus house to get some computer-grade caps of 10,000 uF and 30V, at a cost of a dollar each. The Radio Shack store recommended some fancy line conditioning equipment that cost more than the basic TRS-80.

My first introduction to the TRS-80 occurred when a manufacturer was loaded up by

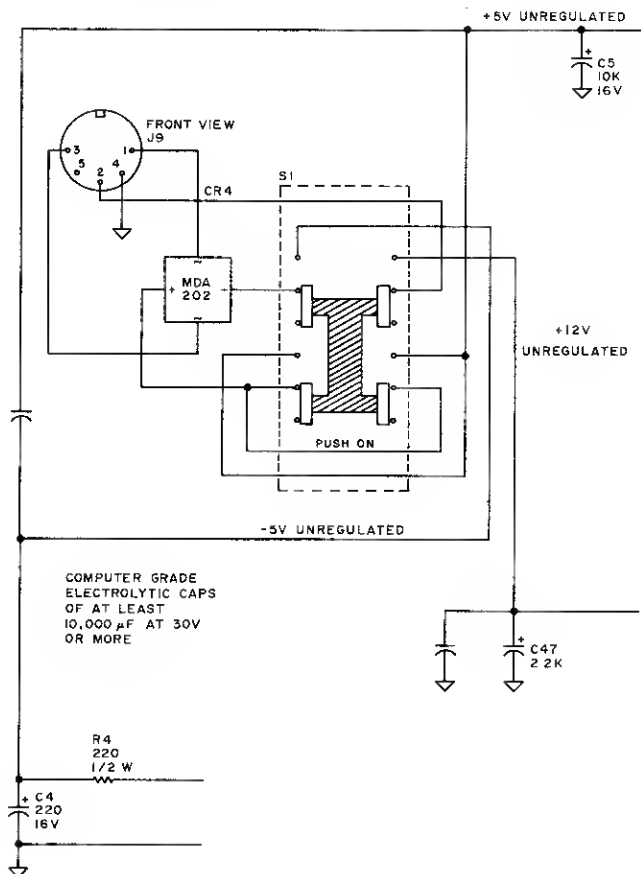


Fig. 1. TRS-80 Expansion Interface Schematic.

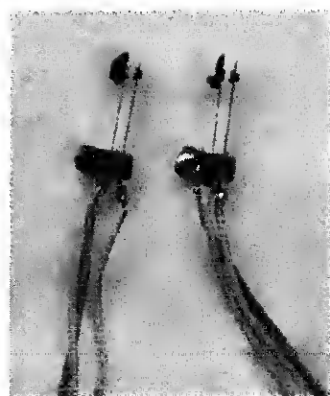


Photo 1. Reshaped Cam

(See Fig. 1.) The power supply is typical of both keyboard and expansion interface supplies. The ones on the expansion interface were mounted in the power supply cavity.

I felt it was a good practice to remove the mag field and source of heat from inside the case. The power supplies and caps for the keyboard were mounted under the Radio Shack supplied table.

TRS-80 Disaster Saver

One day after entering over 1200 items of inventory the power went off. When it returned the LEDs on the disk drives lit and they started doing something—writing garbage into several sectors of my inventory disk.

I wrote a repair program and went on.

Then it happened again with the same results. I could see myself married to this thing and

Some shifty diskwork.

Displaced Programs

Ron Moehlis
3621 Clearview Dr.
Cedar Falls, IA 50613

from the disk, shift it back to its original position and jump to the start of the program. If you have T-BUG and EDT/ASM, you can do it too. Now T-BUG normally occupies 4380H-4980H and EDT/ASM 4300H-5D40H. Execution of the EDT/ASM starts at 468AH.

The Technique

Here is the technique for the EDT/ASM. The minimum requirements are a 16K system with one disk. The program for shifting memory, shown below, can be entered using T-BUG. The shift is made from 4300H-5D40H to 6300H-7D40H.

Address	Hex	Instructions
6000H	21 00 43	LD HL,4300H
6003H	11 00 63	LD DE,6300H
6006H	01 40 1A	LD BC,1A40H
6009H	ED B0	LDIR
600BH	C3 19 1A	JP 1A19H

After entering the above then J 1A19 takes you back to BASIC2. Now enter your EDTASM program as illustrated below:

```
SYSTEM (ENTER)
EDTASM (ENTER)
/24576 (ENTER) instead of / (ENTER)
```

You now have a copy of the EDT/ASM in memory from 6300H-7D40H.

Now re-enter T-BUG in the usual manner and add the program below to your copy of the EDT/ASM in high memory to enable it to shift back to its original position.

Address	Hex	Instructions
7D50H	21 00 63	LD HL,6300H
7D53H	11 00 43	LD DE,4300H
7D56H	01 5D 1A	LD BC,1A5DH
7D59H	ED B0	LDIR

7D5BH C3 8A 46 JP 468AH

Now store the high memory EDT/ASM plus the above shift program using

P 6300 7D5D 7D50 EDTASM

At this point you now have your backup copy of EDTASM which you can use like the original. Now put it on the disk! Load in TRSDOS and load in the above cassette program using the following steps.

```
TAPEDISK (ENTER)
?C (ENTER)
?F EDTASM/CMD:063007D5D7D50 (ENTER)
?E (ENTER)
```

You now have EDTASM on disk. After DOS is displayed, type in EDTASM (ENTER) and you're ready to go. ■

The problem of creating a backup copy of the EDT/ASM made me curious as to how one could put machine language programs such as this on a disk. The main difficulty is that TRSDOS and many other programs occupy common memory positions. But after reading Chapter 6 in TRS-80 Assembly Language Programming by William Bardon Jr. I found one could do this quite easily.

The idea is to shift your program to upper free memory, and store this on a disk. When you want to use it, load the program

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Unfortunately,

converting your TRS-80 requires installing the video memory chip plus wiring changes. There is only one modification on the market which eliminates most of the wiring. To get the dualcase mod installed you have three choices: 1) Send your computer to a company or individual who will do the wiring, 2) do it yourself, or 3) "THE PATCH" (trade mark).

To make choices 1 & 2 operate requires using software overhead in the form of a "driver". This takes 30 bytes, unless you want a "normal" shift to UPPERCASE keyboard. That takes upwards of 60 more bytes. Software oriented mods have three more disadvantages: 1) They reside in program memory, eating program space which you could be using, 2) other machine language programs are unusable if they are loaded against the top of memory, or 3) the "driver" software MUST be loaded every time you power-up, or the "MEMORY SIZE?" appears due to program bomb. Choice number three suffers from NONE of the software overhead problems. We call it "THE PATCH" and it's new for the 80's!

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Copy tapes containing assembler source or object codes in one easy step with this routine.

TCOPY

Dennis Stevens
10895 Kemah Lane
San Diego CA 92131

Most users of cassette tapes have probably heard the advice to use short tapes and put no more than two programs on a tape. If you're like me, you probably thought that

was good advice, but you have never been that organized before. Why start now? It is so much easier to string programs out on a 60 or 90 minute tape than to go out and buy new tapes; there always seems to be room for another program.

But if your tape contains a mixture of BASIC code, assembler source code and object code, you will have a long job ahead of you to make a duplicate of the entire tape. Most routines for copying tapes involve loading the entire program into the computer, then writing it out on tape. This means a CLOAD and a CSAVE for each BASIC program and loading the assembler and the source code, followed by writing the source code and object code on tape for each machine-language program. Or you might have access to a copying program for object code that must first be loaded into the computer, which then reads in the object code and writes the program onto tape.

It occurred to me that all of these different kinds of program codes (including Levels I and II) exist on tape in fundamentally the same form: short audio bursts or pulses followed by a

period free of such disturbances. The nature of the pulses is conceptually the same for all tapes made by TRS-80; it is only the way that they are interpreted that is different. So why not write a program that detects the pulses and, as each pulse is detected, immediately sends out the pulse and records it on a second recorder?

The pulse width is always much smaller than the time be-

tween pulses (or it should be). So there is enough time to write out a pulse before the next one comes along. In effect, the computer would then be functioning only as a signal conditioner.

The Program

I set out to write such a program. The flowchart is shown in Fig. 1. After the recorder is turned on, the program waits for a pulse from the source tape

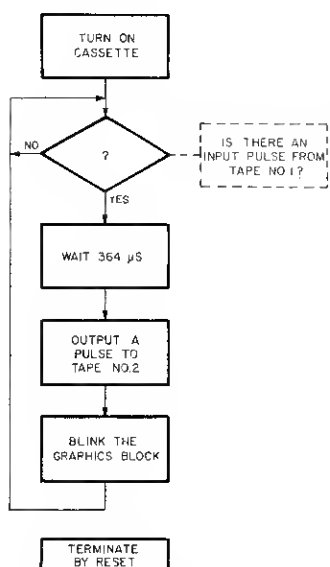


Fig. 1. TCOPY flow diagram

```

4FD3      00100      TCOPY      ORG      4FD3H
4FD3      3E04      00110      LD      A,A
4FD5      03FF      00120      OUT     (OFFH),A ;CASSETTE ON & D7=0
4FD7      213F3C    00130      LD      HL,3C3FH ;HL POINTS TO CORNER OF SCREEN
4FDA      0BFF      00140      PULSE   IN      A,(OFFH) ;WAIT FOR A PULSE
4FDC      17        00150      RLA
4FDD      30FB      00160      JR      NC,PULSE ;JUMP ON NO PULSE
4FDF      0632      00170      LD      B,32H
4FE1      10FE      00180      DJNZ   $ ;DELAY 364 MICROSEC.
4FE3      3E05      00190      LD      A,5
4FE5      03FF      00200      OUT     (OFFH),A ;PULSE IS HIGH
4FE7      0610      00210      LD      B,10H
4FE9      10FE      00220      DJNZ   $ ;PULSE HIGH FOR 129 MICROSEC.
4FEB      3E06      00230      LD      A,6
4FED      03FF      00240      OUT     (OFFH),A ;PULSE IS LOW
4FEF      0610      00250      LD      B,10H
4FF1      10FE      00260      DJNZ   $ ;PULSE LOW FOR 129 MICROSEC.
4FF3      3E04      00270      LD      A,4
4FF5      03FF      00280      OUT     (OFFH),A ;PULSE NEUTRAL & D7=0
4FF7      7E        00290      LD      A,(HL)
4FF8      3C        00300      INC     A ;CHANGE CHARACTER ON SCREEN
4FF9      F680      00310      OR      B0H
4FFB      E6BF      00320      AND     0BFH ;CHARACTER IS A GRAPHICS BLOCK
4FFD      77        00330      LD      (HL),A ;DISPLAY CHARACTER
4FFE      1B0A      00340      JR      PULSE ;LOOK FOR NEXT PULSE
4FD3      00350      END      TCOPY
00000      TOTAL ERRORS
PULSE      4FDA
TCOPY      4FD3
  
```

TCOPY program

(tape #1). When a pulse is detected, a 364 microsecond delay is incurred to allow the pulse to subside. Then a pulse is written on the destination tape (tape #2).

A graphics character in the upper right-hand corner of the screen is blinked, and we then go back to the start of the program and wait for the next pulse. When the graphics character stops blinking, you know that the copy is complete. You can stop execution by pressing the reset button, or you can let

the tapes run onto the next program.

The program listing is short (45 bytes) and simple. This makes it easy to POKE in from BASIC or to enter via a monitor (e.g. T-BUG) or an assembler, then copy the program onto tape. The program is executed by entering SYSTEM and then entering /20435 (or just / if no other machine-code tape has been entered after the TCOPY tape).

But first make the recorders ready (i.e., recorder #1 in play

mode with the black plug in its EAR jack and recorder #2 in record mode with larger gray plug in its AUX jack). When you terminate the program by reset, only the recorder with the REMOTE jack connected will stop.

After trying the program out, I found it to have some very desirable features. Since you read and write simultaneously, the process is faster than other methods requiring that the program be read in its entirety, then written onto tape. The longer the

program, the more time is saved.

TCOPY will copy tapes of any length (even if the program to be copied is larger than the unused memory in your machine). The program is completely independent of the ROM, so it should work on Level I machines (although I have only demonstrated it on a Level II machine).

The method has one major drawback—two recorders are required. But this requirement is essential and inherent to some of the advantages listed above. ■

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Limited printer width? Use these BASIC subroutines to tidy up your output.

Format 40

John D. Adams
13126 Tripoli Ave.
Sylmar, CA 91342

If some of you, like myself, need hard copy, but can neither afford nor justify the thousand dollars plus for a nice line printer, you might consider one of the smaller printers now on the market.

I did a lot of looking around and finally decided on the TRENDCOM 100. I've used it for several weeks now, and it's an excellent machine, but it does have its shortcomings. One of these is paper width, as it has a forty space print width.

I take pride in having my printouts neat, and I assume you do also. The TRENDCOM's forty space line poses some problems in designing your formats. I've written three subroutines to cope with some of the problems. They are simple and should be adaptable to any forty space printer, or, for that matter, to any printer.

All of them are written using as few variable letter names as possible, so that if the variable is already in use in the program, conversion is simple.

String space is another problem, depending on your RAM capacity. All three of the subroutines need some string space CLEAR'ed, and this must be done at the beginning of the program. Should your TRS-80 encounter a CLEAR instruction during program execution all of your data will be lost.

A Line Formatter

Data are sent to the printer as a single stream of characters. When the printer reaches the fortieth character, it inserts a line feed. This may come in the middle of a word or number group. If you have long strings to print you may, of course, count the characters when you enter them or simply convert them to short strings. But that is the computer's job, not yours.

The subroutine in Listing 1 formats the lines, using the following variables:

AS—string to be printed
R1—number of lines to be printed
R2—loop counter
R3—counter
R4—length of original string
R5—counter
R1\$(n)—storage of formatted lines

Line 5 clears the string space at the beginning of the program. Double the original string space count. The string in Listing 1 is 149 characters long and requires clearing 293 spaces for the routine to run without OS error. Note the END in line 30. If the program continues after the subroutine terminates, this line can be omitted or a GOTO instruction inserted instead.

Line 30000 determines the string length and the number of lines it will need plus two lines to make up for the extra spaces picked up. Line 30020 finds the first space before position 40. Using this information, lines 30030 and 30040 divide the original string into segments that print into forty spaces without dividing words or number groups. Line 30050 prints the new lines, zeros R3 and returns to the main program.

The BASIC routine uses about 250 bytes. I had five long strings in my 16K machine and it formatted all of them without error. But this sort of thing is costly to RAM space. If you are running short of RAM consult pages 11/1 and A/16 of the Level II User's Manual.

Printing Alphabetical Listings

I teach algebra and accounting, and when I first got my printer I was anxious to have it print grade listings. I wanted

them to be alphabetical, of course, and also in two columns to save on the thermal paper my printer uses. Getting the names alphabetized and printed was no problem, except that the listings were alphabetical in left-right, left-right order.

The subroutine in Listing 2 has three functions. It allows you to enter names in any order. It then lists them alphabetically, and, finally, prints them in two columns vertically. The variables used are as follows:

SUBROUTINE FOR LINE FORMATTER:

```
5 CLEAR 500
10 REM - PUT LINE TO PRINTED INTO A$
20 GOSUB 30000
30 END
30000 R1=LEN(A$):R4=R1:R1=INT(R1/40)+2:A$=A$+" "
30010 FOR R2=40 TO 20 STEP -1
30020 R3=MID$(A$,R2,1):IF R3=" " THEN 30030 ELSE NEXT
30030 R3=R3+1:R1$(R3)=LEFT$(A$,R2):IF R3=R1 THEN 30050
30040 A$=RIGHT$(A$,R4-R2+1):R4=R4-R2:GOTO 30010
30050 FOR R5=1 TO R1:LPRINT R1$(R5):NEXT R3=0:RETURN
```

LISTING WITHOUT FORMATTER:

```
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LISTING WITH FORMATTER:

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Program Listing 1.

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N\$(n)—storage for names
 N1\$—used in sort routine
 E1—counter
 E2—counts names in list
 E3—flag
 E4—number of lines needed in printout

Line 5 clears string space, defines variables and dimensions N\$. The names on the printout total 68 characters and the program runs with 85 spaces cleared. Allowing 10 bytes per name should be plenty. Variable E is defined as an integer to make the sort run faster. If your list contains more than 50 names, dimension N accordingly.

Lines 10 to 30 are for entering names—in any order. If names are already in memory they can be omitted. Line 30000 counts the names in the array. Lines 30010 and 30020 are a standard sort routine. Line 30030 prints

out the list.

This type of sort takes time to complete. In a dozen trial runs with 40 names entered in various orders, the run time averaged about 38 seconds. Shorter lists sort faster and vice versa. The BASIC routine takes about 270 bytes.

Figures and Columns

Since data are calculated, arranged and printed in so many ways this routine is not meant to be specific, but rather an example of what can be done using the PRINT TAB and PRINT USING instructions. With a little ingenuity a very presentable printout can be prepared. Compare the two printouts in Listing 3.

Using a format specifier can add dollar signs, line up the decimals, add trailing zeros, etc. The variables used are as follows:

M0\$(n)—data storage
 M1\$(n)—data storage
 M\$(n)—column headings
 M\$—stores output format
 M—counter
 M4 to M6—tab stop locations
 M7 to M9—LEN(M\$)—LEN(M\$(n))

Line 5 clears string space for non-numerical data. Line 10 is used to enter the names of the months and to generate random data. You might use it to check the program, but it should be omitted if data is present in memory. Be sure your information is in the right variable locations.

Line 30000 requests format. For this example I use

"\$####.##". The next two lines are self-explanatory. Line 30030 calculates the difference between the length of the format string and the column heading string. Subtracting this from the original tab stop locations positions the data under the proper column heading. Line 30035 prints the column headings, and lines 30050 and 30060 print the data using the tab stops and format specifier string combined. Tab stops in this example are 12, 22 and 32.

Although this routine is tailored to one application the idea can be adapted to almost any printout situation. ■

SUBROUTINE FOR ALPHABETIZING:

```
5 CLEAR 500:DEFINT E:DEFSTR H:DIM N(50)
10 FOR E1=1 TO 50
15 CLS:PRINT"ENTER NAME"
20 INPUT"ENTER NAME";N(E1)
30 IF N(E1)="" THEN GOSUB 30000 ELSE NEXT
40 REH * CONTINUE PROGRAM EXECUTION *
30000 FOR E1=1 TO 50:IF N(E1)="" THEN 30
010 ELSE E2=E2+1:NEXT
30010 E3=0:FOR E1=1 TO (E2-1):IF N(E1)<=
N(E1+1)THEN 30020 ELSE N1=N(E1):N(E1)=N(
E1+1):N(E1+1)=N1:E3=1
30020 NEXT:IF E3=1 THEN 30010
30030 E4=INT((E2/2)+.5):FOR E1=1 TO E4:L
PRINT N(E1):LPRINT TAB(20) N(E1+E4):NEX
T:E2=0:RETURN
```

LISTING WITHOUT SUBROUTINE:

WILLIAMS	BURKE
SMITH	JONES
HILLER	ADAMS
THOMPSON	DALTON
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LISTING USING SUBROUTINE:

ADAMS	PURCELL
BURKE	SMITH
COLLINS	THOMPSON
DALTON	TRAVERS
JONES	WILLIAMS
HILLER	

Program Listing 2.

SUBROUTINE FOR FORMATTING COLUMNS:

```
5 CLEAR 100
10 FOR M=1 TO 6:INPUT"ENTER MONTH";M0$(M)
:M1(M)=RND(30126)/100:M2(M)=RND(30126)/
100:M3(M)=RND(30126)/100:NEXT
20 GOSUB 30000
30 END
30000 INPUT"ENTER FORMAT";M$
30010 INPUT"ENTER COLUMN HEADINGS";M1$,M
2$,M3$,M4$
30020 INPUT"ENTER TABS FOR COLUMNS 2, 3,
AND 4";M4,M5,M6
30030 M7=LEN(M$)-LEN(M2$):M8=LEN(M$)-LEN
(M3$):M9=LEN(M$)-LEN(M4$)
30035 LPRINT M1$:LPRINTTAB(M4)M2$:LPR
INTTAB(M5)M3$:LPRINTTAB(M6)M4$:LPRINT
30040 FOR M=1 TO 6
30050 LPRINT M0$(M):LPRINTTAB(M4-M7)USI
NGM$:M1(M):LPRINTTAB(M5-M8)USINGM$:M2(
M):LPRINTTAB(M6-M9)USINGM$:M3(M)
30060 NEXT:RETURN
```

PRINTOUT WITHOUT FORMATTING:

MONTH	AREA 1	AREA 2	AREA 3
JANUARY	299.48	166.12	231.16
FEBRUARY	285.68	275.48	216.04
MARCH	92.56	199.95	8.5
APRIL	254.22	244.43	230.13
MAY	224.39	221.08	212.13
JUNE	140.54	221.24	230.89

PRINTOUT WITH FORMATTING:

MONTH	AREA 1	AREA 2	AREA 3
JANUARY	\$116.88	\$158.50	\$194.51
FEBRUARY	\$182.41	\$28.66	\$295.75
MARCH	\$240.27	\$256.56	\$151.90
APRIL	\$24.96	\$158.80	\$150.78
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Program Listing 3.

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Michael E. Daniels
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This program finds the real root of an algebraic or transcendental equation by means of the incremental, or trial and error, search method. Written for the TRS-80 Level II micro-computer, it can be run on a 4K

system.

This method determines values of $f(X)$ for successive values of X in some interval, until a sign change occurs for $f(X)$. A sign change indicates that a root has been passed.

Returning to the last value of X before the sign change and continuing the search with a smaller increment of X , until the sign of $f(X)$ changes again, can give you a more accurate approximation of the root.

This procedure is repeated until a sufficiently accurate value of the root is obtained

(Fig. 1).

The Equation

To illustrate this method, take the equation

$$F(X) = 2X^2 + 1 - e^X$$

$F(X)$ is entered at lines 90 and 110, which then look like this:

```
90 Y = 2 * X^2 + 1 - EXP(X)
110 Y1 = 2 * X1^2 + 1 - EXP(X1)
```

Type in RUN and hit ENTER, and the program will ask if you need details: 1=yes, 0=no. If you have entered $f(X)$ at lines 90 and 110, type "0" and hit enter. The program will ask for X , DIX , Error Value, and X max.

For our example, I chose the following values: $X=0$, $DIX=.1$, Error Value = .00001 and X max = 3.0. When these values are entered, the computer processes the data and displays the following output:

```
X = 0
X = .74084
X = 2.84267
THERE ARE NO MORE REAL ROOTS
WITHIN THE RANGE OF XMAX.
```

Problems with this Method

This method of obtaining roots can be very time-consuming if the chosen increment of search is too small. Conversely, when the increment is too large and the roots of the equation are very close together, it could skip right over them.

In our example, if the increment of search chosen was .01, it would seem like hours had passed before each root was outputted. If the increment chosen was 1, the computer would skip over the root $X = .74084$.

By first plotting the equation with a graphing routine, you can approximate the roots and then use the following program to zero in on them. ■

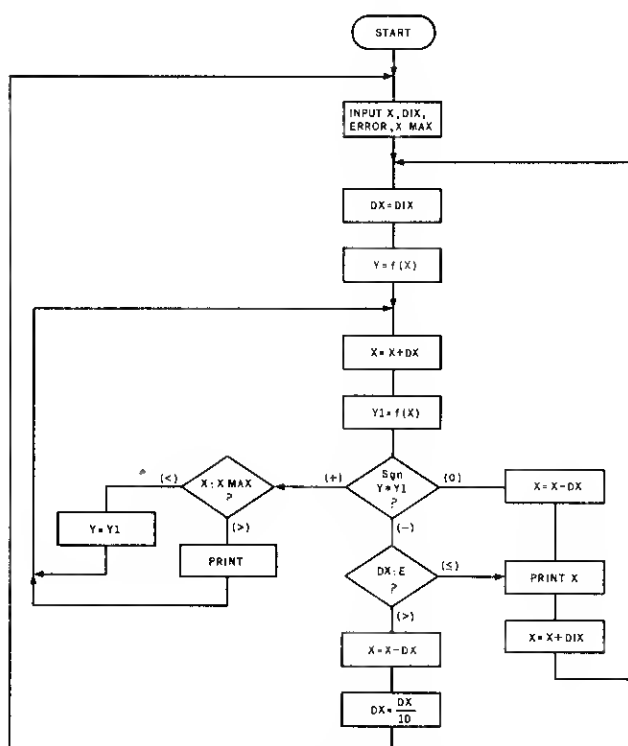


Fig. 1. Flowchart for Real Roots by trial and error.

```

20 PRINT:PRINT"DETAILS? 1=YES, 0=NO. (0 ASSUMES Y AND Y1 ARE ENT
   ERED)":INPUT Z:IF Z=0 GOTO 60
30 CLS:PRINT:PRINT"ENTER Y AT LINE 90 AND Y1 AT LINE 110.":PRINT"
   Y=F(X), AND Y1=F(X). THAT'S RIGHT F(X) AT BOTH LOCATIONS."
31 PRINT"X IS THE STARTING POINT FOR THE SEARCH"
32 PRINT"DIX IS THE INITIAL INCREMENT OF SEARCH"
33 PRINT"E IS THE DESIRED ACCURACY OF THE ROOT"
34 PRINT"XMAX IS THE MAXIMUM VALUE OF X TO BE SEARCHED"
40 PRINT"ENTER 0,0,0,0 TO TERMINATE PROGRAM"
50 GOTO 210
60 INPUT"ENTER X,DIX,ERROR VALUE,MAXIMUM X":X,DIX,E,XMAX
70 IF X+DIX+E+XMAX=0 GOTO 210
80 DX=DIX
90 GOTO 30
100 X=X+DX
110 GOTO 30
120 ON SGN(Y*Y1)+2 GOTO 150,170,130
130 IF X>XMAX GOTO 200
140 Y=Y1:GOTO 100
150 ON SGN(DX-E)+2 GOTO 170,170,160
160 X=X-DX:DX=DX/10:GOTO 100
170 X=X-DX
180 PRINT"X=";X
190 X=X+DIX:GOTO 80
200 PRINT"THERE ARE NO MORE REAL ROOTS WITHIN THE RANGE OF XMAX."
   :GOTO 60
210 END
```

Program Listing.

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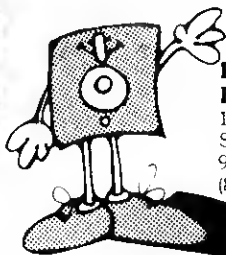
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Demo's can be arranged. Price \$2800; Manual \$35.00;
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Every entry can be edited at any time. If an incorrect or missing transaction is found after statements are printed, the corrections can be made and the statement reprinted. Sales tax and monthly data in disk files are adjusted by this process.

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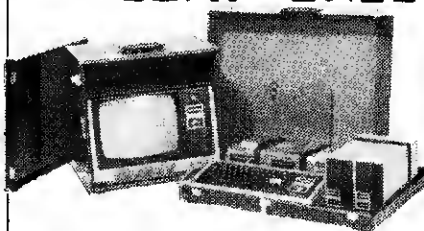


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✓ 317

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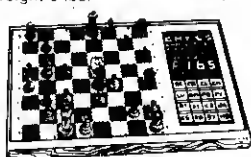
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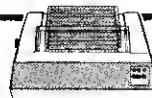


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2330	577-01	soft sector certified	\$49.95
2331	577-10	10 hole, hard, certified	\$49.95
2332	577-16	16 hole, hard, certified	\$49.95

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1938	Accessing Software, tracks 36-40	4 oz.	\$10.50
1485 D	MS-80 MPI S1 Manual	2 oz.	\$1.75
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CAT NO.	DESCRIPTION	WT.	PRICE
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2377	Black Jack	6 oz.	\$16.75
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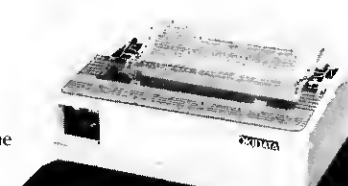
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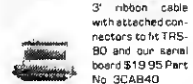


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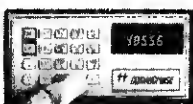


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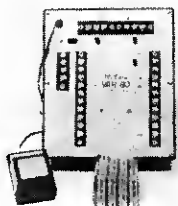
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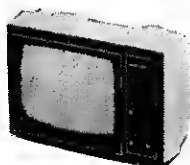


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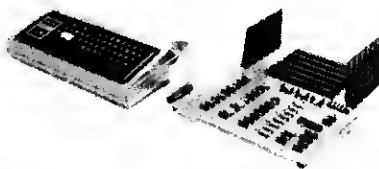
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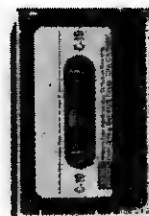
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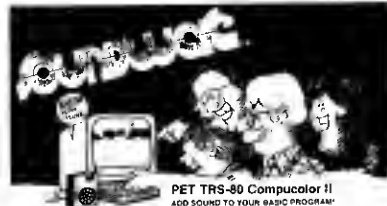


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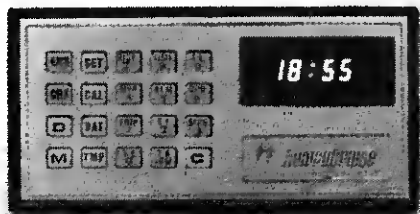
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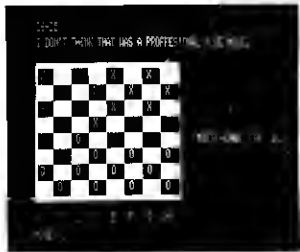
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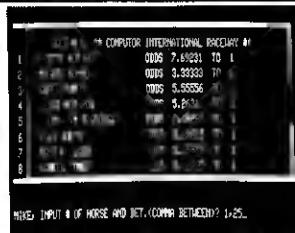
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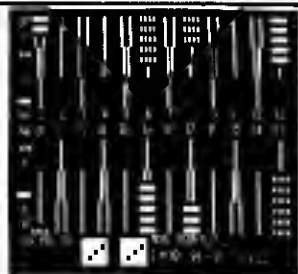
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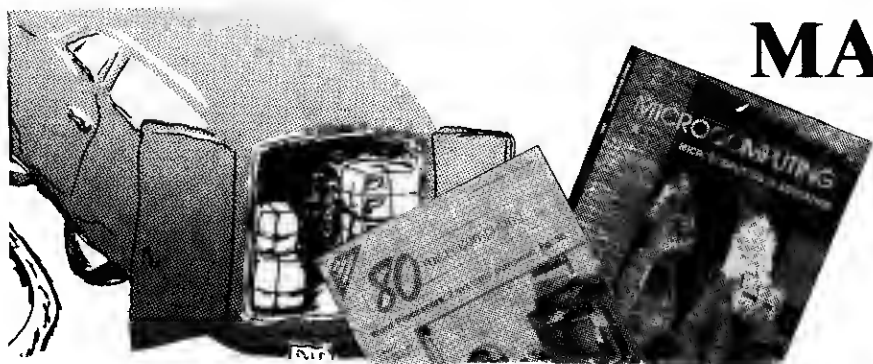
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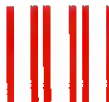
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